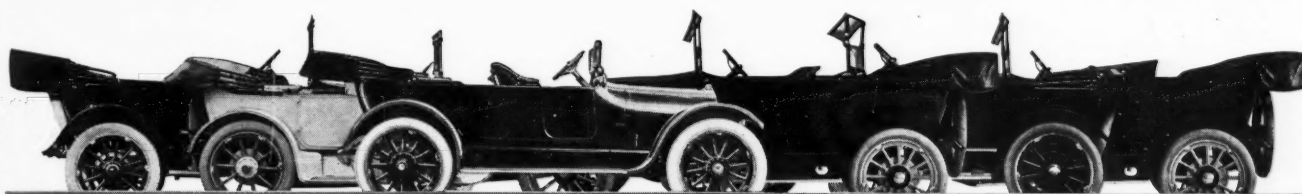


MOTOR AGE

Vol. XXVIII
No. 1

CHICAGO, JULY 1, 1915

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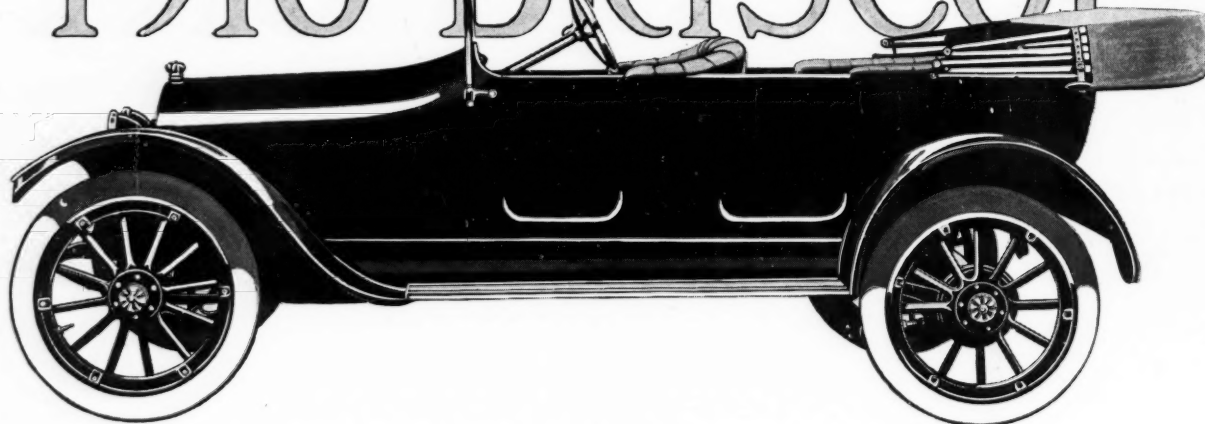
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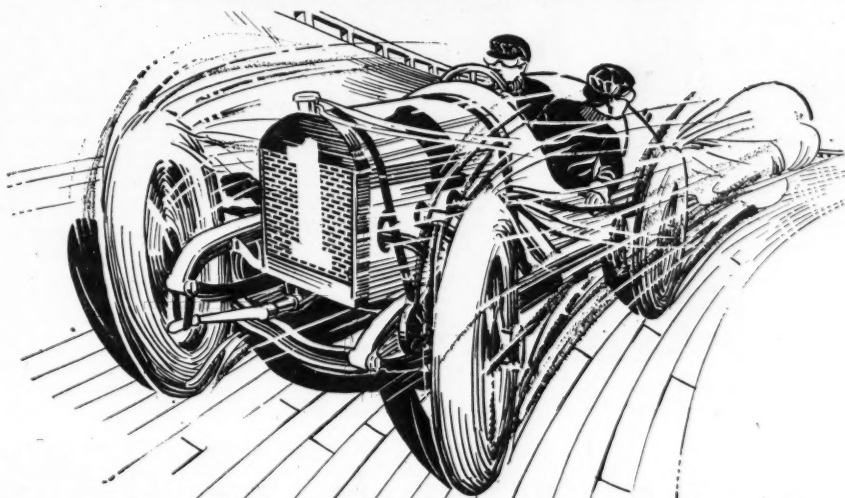
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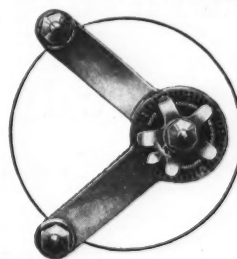
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was the speed of Resta and his Hartford-equipped Peugeot, winners of the fastest track race ever run. Here are the figures:

	TIME	M.P.H.
1—Hartford-equipped Peugeot, Resta	5:07:26:00	97:58
2—Hartford-equipped Sunbeam, Porporato	5:10:50:45	96:50
3—Hartford-equipped Maxwell, Rickenbacher	5:11:50:23	96:32
4—Hartford-equipped Stutz, Cooper	5:15:59:15	95:00
5—Hartford-equipped Sunbeam, Grant	5:18:11:58	94:30

So tremendous a pace would have been impossible without Hartford Shock Absorbers to absorb vibration, jolt and jar; to save tires from excessive strain and wear by eliminating the bounce of wheels and by minimizing skidding.

The Hartford meets the requirements of everyday motoring with the same efficiency that it does those of extraordinary

	TIME	M.P.H.
6—Hartford-equipped Stutz, Anderson	5:20:09:86	93:90
7—Hartford-equipped Delage, Chevrolet	5:23:05:61	92:90
8—Hartford-equipped Peugeot, Burman	5:25:12:61	92:20
9—Hartford-equipped Duesenberg, Alley	5:28:33:88	91:30
10—Hartford-equipped Sebring, J. Cooper	5:32:10:42	90:40

events like Stutz transcontinental performance and this great race in which new world's records were established for 100, 200, 300, 400 and 500 miles.

Your car needs it. Write, mentioning make, year, model, and we will tell you how to make it truly comfortable. You can have the Hartford on your new car if you insist.

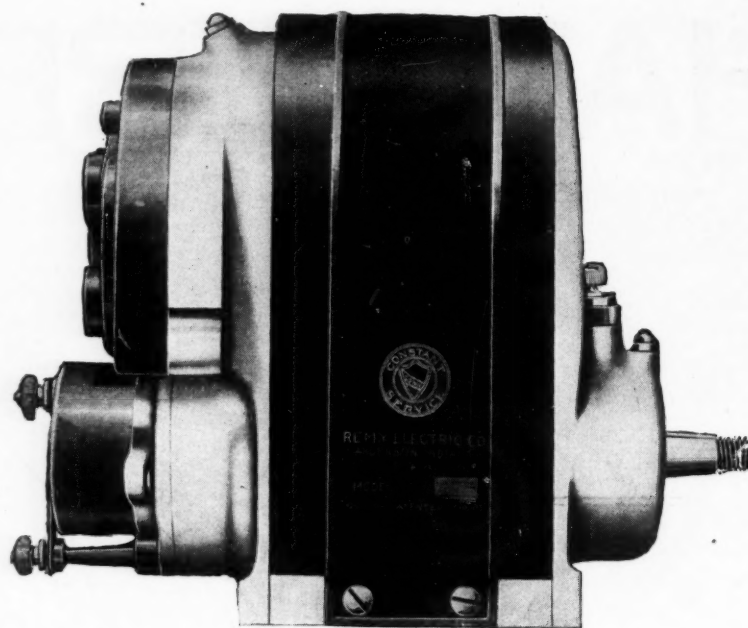
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Are used throughout this Magneto

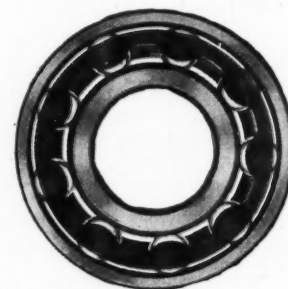
THIS *guaranteed* ball bearing, designed to carry light loads at high speeds, facilitates assembly, simplifies construction, and enhances the quality of any mechanism in which it may properly be installed—New Departure magneto bearings are now used extensively in American ignition, starting and lighting apparatus.



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Balls, Separator and Cone



Back

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Volume XXVIII

July 1, 1915

No. 1

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In next week's issue of Motor Age, the holiday races at Sioux City, Omaha and Tacoma will be described and illustrated as the feature.

July Ushers in Biggest Touring Season in Motoring History

Touring motorists need special equipment, the lack of which has not been so noticeable in simply driving "round home."

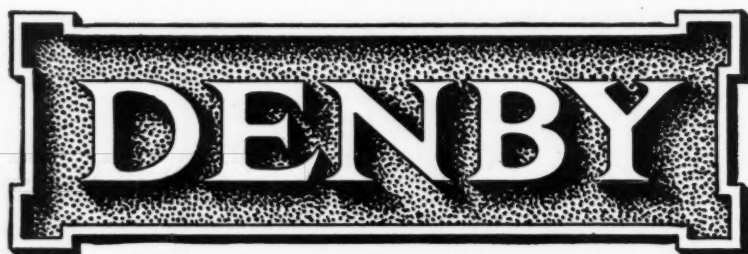
These touring motorists need shock absorbers for comfort on country roads—power tire pumps for punctures and blowouts that come miles from a "free air" garage—extra spark plugs—speedometers that check exactly with their Blue Books—extra tires and extra tubes able to stand the gaff—warning signals that guarantee safety on strange roads—tool kits that make roadside repair work easy—lighting and starting systems that make the tour more pleasureable—carburetors that are reliable—auto clocks that tell time—goggles—motoring clothing—and a host of other equipment.

Touring motorists—and the most enthusiastic of them read MOTOR AGE—will give advertised goods the preference. Dealers sell the goods for which there is the demand.

What you have done before has paved the way, but advertising now, and throughout the next three months, will point sales in your direction at buying time.

MOTOR AGE

910 South Michigan Avenue, Chicago



and Now—

Radical Price-Reductions Made Possible *by* Radical Cost-Savings

Denby trucks take new list prices beginning July 1. Greatly increased business; further economy in manufacture through superior engineering and shop-system; the great purchasing power of the men back of the business, who annually buy millions of dollars worth of motor-car parts—these things have made the lower list possible. They have enabled us to sell Denby trucks at prices that were considered impossible, even six months ago, and to do this without lowering, in any particular, the high standards set at the inception of this company.

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Type B, 1 -Ton	.	.	\$1475
Type D, 1½-Tons	.	.	1685
Type E, 2 -Tons	.	.	1985

Price has never been the prime consideration with the Denby Motor Truck Company. We built our trucks to render reliable, uninterrupted service at the lowest possible operating and maintenance cost, and placed the prices at the point necessary to produce trucks of this standard.

And we have not cheapened Denby trucks in any way. We have improved and refined them wherever possible. Our engineers have spent a year in revising details of construction and manufacturing methods so as to save time in machining and assembly. We have designed and made special tools and fixtures to enable us to produce Denby trucks at a lower cost.

The special Denby features which have commended themselves to the discriminating public

—the unit power-plant, internal-gear drive axle, cast-tank radiator, extra large springs, the heavy frame—have been retained and made even better.

Denby trucks have always been a "Good Buy." They were the result of years of experience in designing and building high quality motor trucks. They were further developed, when placed on the market, than any trucks then built. When they were first offered to the business public, they set a new standard of quality and of value. In a wide variety of applications, in all kinds of service, their ability, economy, and reliability gained immediate recognition.

With the same efficient trucks, the same factory service and merchandising, and the new low prices, the Denby is today without competition.

Our proposition to the dealer is distinctly out of the ordinary, both in liberality and in thoroughness of co-operation. Our present dealers are operating under it with exceptional success. We shall be glad to go into the matter in detail with any responsible concern on request.

Denby Motor Truck Company, 46 Dubois Street, Detroit, Mich.

MOTOR AGE

Dario Resta Dedicates Chicago Speedway with Victory in Record-Smashing Race

Italian's Peugeot First to Cross Tape in Inaugural Contest on New Board Track and Averages 97.58 Miles Per Hour for Five Centuries

By J. C. Burton

CHICAGO, June 26—Chicago witnessed today the sacrifice of time, the conquest of distance and the coronation of a new world's speed king.

A 2-mile track of wood, banked high at the turns and faster than the famous Brooklands, was the scene of the triple achievement, and Dario Resta is the first of a new dynasty of Mercurian monarchs that was established at 37 minutes after 3 o'clock this afternoon.

At the wheel of his invincible blue Peugeot, the crafty Italian carried away premier honors in the inaugural race run on the new Chicago speedway, the first 2-mile board track to be dedicated in this country. Man and motor car never traveled at a higher speed for 500 miles than did the conquering combination of Resta and Peugeot. The five centuries were completed in 5 hours, 7 minutes, 26 seconds, an average of 97.58 miles per hour. He showed no mercy to time or his car in his unparalleled drive. Time was too

stunned by his daring and audacity to protest. The Peugeot, giving no quarter, asked none.

Resta's crown is studded with new



DARIO RESTA,

Winner of Saturday's race, is an Italian by birth but a resident of London. In his first American campaign, he has won the Vanderbilt cup, the grand prize and the Chicago race and finished second at Indianapolis.

NO. 1 PEUGEOT

The world's greatest space-destroyer, was originally built for the French grand prix of 1914, but was not started, as the builder did not consider it speedy enough.



JEAN PORPORATO AND HIS SUNBEAM, WINNER OF SECOND MONEY

records. The Italian's Durbar and the dizzy episodes preceding it were epoch-making. Records, made both at Indianapolis in competition and at Brooklands in time trials, were slashed, mutilated and smashed as Dario, the I, whirled in spectacular triumph to his throne.

Time Bows Knee

In order to win, Resta had to shatter records. The drivers that pursued him were as merciless as he. All ten cars to finish inside the money broke Ralph de Palma's 500-mile mark of 89.84 miles per hour, established at Indianapolis 4 weeks ago, and the first four to get the checkered flag bettered the Brooklands' average for five centuries of 94.75 miles an hour, made by the Sunbeam in 1913.

Resta did not have many minutes to spare when he shot over the tape for the last time. Close behind him was another swarthy son of Italy, another speed Alexander of Europe seeking new worlds to conquer in America, Jean Porporato, who annexed second money with the green Sunbeam. Porporato trailed the winner by 3 minutes 24 seconds. His time was 5 hours, 10 minutes, 50.45 seconds, and his average, 96.5 miles per hour.

In fact, Porporato was Resta's most dangerous challenger after the first 50 miles had been turned and he led the field under the wire at the completion of the first century, averaging 99.05 miles for the distance and winning \$1,000 for setting such a furious pace.

Rickenbacher's Maxwell was the first American entry to get the checkered flag. The hard-driving Teuton, noted for his relentlessness, captured third place and averaged 96.43 miles an hour.



His time for the 250 circuits of the 2-mile oval was 5 hours 11 minutes 50 seconds and he lost second money by the eyelash margin of only 1 minute.

Earl Cooper brought another American car, a Stutz, home in fourth place, the greatest of the California drivers completing the 500 miles in 5 hours 15 minutes 59.15 seconds, and averaging 95 miles per hour. Like Porporato, Cooper clung to the victorious Peugeot with the tenacity of a bulldog, and although handicapped by a leaking radiator from the 250-mile post on, attempted to tease Resta into pounding his car to pieces.

Harry Grant, who was fifth, came into his own again today. At the wheel of a six-cylinder Sunbeam, the veteran, whose fame has been in partial eclipse since he captured two Vanderbilt cup classics, drove the 500 miles without a single stop at his pits and established a new world's record for motorized perpetual motion. What is all the more remarkable is that in his unprecedented achievement, Grant completed the five centuries in 5 hours, 18 minutes, 11.58 seconds, and averaged 94.3 miles per hour in his flight.

A third defender of Uncle Sam's speed honors, and a second Stutz, finished inside the money when Gil Anderson thundered across the wire in sixth position.

His time for the 500 miles was 5 hours, 20 minutes, 9.86 seconds, and his average was 93.9 miles per hour.

France took seventh and eighth money, Louis Chevrolet at the wheel of the Delage, trailing Anderson's Stutz home, and Bob Burman finishing 2 and a fraction minutes after the former Buick driver with his Peugeot. Chevrolet's time was 5 hours, 23 minutes, 5.67 seconds, and his average, 92.9 miles per hour. Burman covered the 500 miles in 5 hours, 25 minutes, 12.61 seconds, and hit a 92.2 mile-an-hour clip.

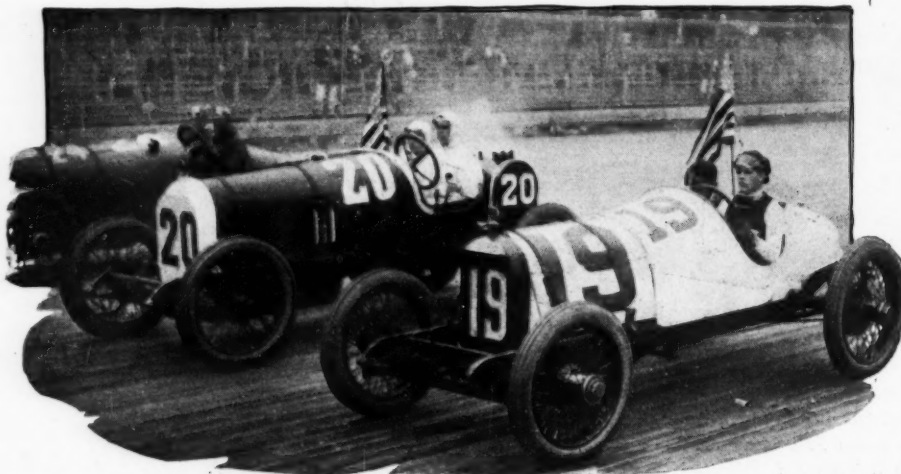
Tom Alley's car was the only one of the three Duesenbergs to finish. Ralph de Palma's former mechanic carried away ninth money with an average of 91.3 miles an hour. His time was 5 hours, 28 minutes, 33.88 seconds. He completed the race on the same four tires as those on which he started, but lost many precious minutes at his pit making mechanical adjustments and tak-

SUMMARY OF CHICAGO RACE

Finish	Car and Driver	Time	M.P.H.	Prize Money
1	Peugeot, Resta.....	5:07:26.00	97.58	\$23,000
2	Sunbeam, Porporato..	5:10:50.45	96.50	11,000
3	Maxwell, Rickenbacher	5:11:50.23	96.43	5,000
4	Stutz, Earl Cooper...	5:15:59.15	95.00	3,500
5	Sunbeam, Grant.....	5:18:11.58	94.30	3,000
6	Stutz, Anderson.....	5:20:09.86	93.90	2,000
7	Delage, Chevrolet....	5:23:05.67	92.90	1,800
8	Peugeot, Burman....	5:25:12.61	92.20	1,700
9	Duesenberg, Alley...	5:28:33.88	91.30	1,600
10	Sebring, Joe Cooper	5:32:10.42	90.40	1,400
11	Peugeot, Babcock....	5:39:19.28	88.40	....
12	Sunbeam, Von Raalte..	5:59:59.85	83.33	....

Running When Race Was Called

Maxwell, Carlson, 244 laps; Maxwell, Orr, 241 laps; Mulford Special, Mulford, 238 laps.



ALLEY'S DUESENBERG, HENNING'S MERCER SPECIAL AND CHANDLER'S OGREN STARTING ON DRESS PARADE LAP

ing on gasoline, lubricants and water.

Joe Cooper's Sebring, a reconstructed Marmon, with a Duesenberg motor, which made its debut at Indianapolis this year, upheld the honor of the dark horses and took tenth place at an average speed of 90.4 miles per hour. His time was 5 hours, 32 minutes, 10.42 seconds, only 24 minutes slower than the time of the winner.

Two other cars, out of a field of twenty-one starters, completed the 500 miles, Babcock's Peugeot finishing eleventh and Von Raalte's Sunbeam twelfth. Three cars were running when the race was called, Carlson's Maxwell having covered 244 laps, Orr's Maxwell 241 laps, and Mulford's Mulford Special 238 laps when they were ordered in by Starter Fred J. Wagner.

Notwithstanding the average speed of the winner was close to 100 miles an hour for the 500 miles, there were but six cars eliminated because of mechanical trouble. This is one of the most remarkable commentaries on the epoch-making race. The unfavored of the gods of speed were Chandler's Ogren, Henning's Mercer Special, Wilcox's Stutz, Limberg's Sunbeam and two Duesenbergs, one driven by Willie Haupt and the other by Eddie O'Donnell.

Records of Two Worlds Smashed

The speed of today's race was terrific, but not altogether unexpected. After the remarkable time made in the elimination trials, when eight cars qualified at a speed greater than 100 miles an hour, the prediction was common that de Palma's Indianapolis record would go by the boards, but very few experts dared prophecy that the time of the winner would exceed 95 miles an hour. It was generally admitted that all American records would be smashed, but the railbirds were too timid to predict that the phenomenal marks made at Brook-

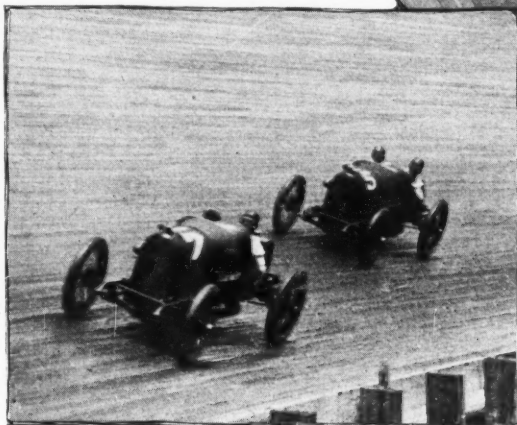
lands, famous the world over for its velocity, would be equalled, let alone surpassed.

Speed Astounding

But Dario Resta proved that the dopsters of the gasoline circuit were too conservative in their predictions. He drove the track at a speed that would be madness were the Chicago course not the safest in the world. At times, when necessity prompted it, he made circuits of the oval at an average of 107 miles an hour.



EDDIE RICKENBACHER, WHO PLACED THIRD, AND THE TWO MAXWELLS ENGAGING IN A FAMILY FEUD

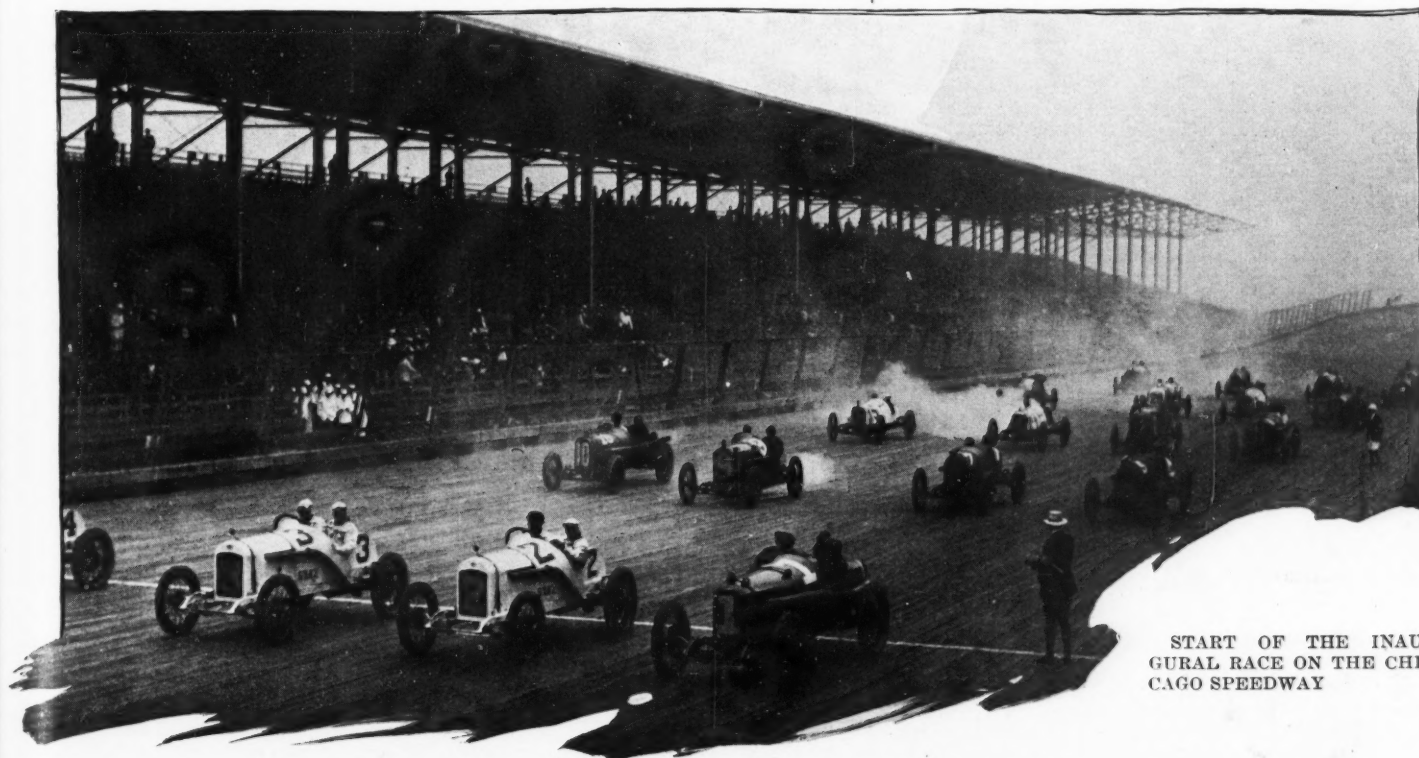


The first lap was made at that speed. So were several others later in the race, when Porporato, Anderson and Earl Cooper grew desperate and shoved the throttle on their cars up to the last notch in hopes of overtaking the blue blur that tauntingly raced away from them.

After Porporato carried away the first \$1,000 prize for making the fastest time in the first century of the five to be cov-

ered, Resta opened up and shot to the front to massacre time. Each mile reeled off by the blue Peugeot meant a new mark in the record books. One thousand dollars was added to the royal treasure of Dario, the I, at the completion of 200 miles, and each succeeding century was worth an equal amount, for distance was given a momentary value today and each mile was worth \$10 to the driver of the fastest car, which proved to be Resta's Peugeot.

The manner in which Resta shattered record after record would have been monotonous had not the speed of the Peugeot been so dizzy and the challenge of



START OF THE INAUGURAL RACE ON THE CHICAGO SPEEDWAY

he demanded more of it than he ever asked of a thoroughbred of steel in his spectacular career as a votary of Mercury, and it was the Stutz that rebelled under the high-speed punishment.

Worn Tires Stop Stutz

For the first ten laps of the whirling, reeling, blinding race, the Stutz cars hung to the Peugeot. Then the desperate chase of the pacemaker suddenly stopped. One by one the three white cars were forced to come into their pits for new wheels, the terrific speed grinding the rubber tread from the right rear tires. Resta also was forced to stop for a wheel before the completion of 25 miles but his first halt gave the Stutz no advantage.

Another stop for tires in the first 100 miles put the Peugeot in third place at the completion of the first century but the lead of Porporato, the pacemaker, over Resta was only a minute. Earl Cooper was in second place, seconds only separating the three leaders. Although he lost time in the first 100 miles, Resta gained strength during that period for the attack of Stutz was partially broken by the elimination of Wilcox's car with a broken piston at the end of 90 miles, and like the Count of

Monte Cristo, the Italian counted "One" as he saw the disabled white mount rolled into the infield. Of the Stutz trio, only Anderson and Cooper were left to torment him, and their cars did not have the speed which Wilcox's had shown at the start.

As the race progressed and Resta, by spectacular driving, shot to the front and gained precious seconds on each succeeding lap, the challenge of Anderson and Cooper became less vexing and it was Porporato that struck fear in the heart of the pacemaker. Anderson did not have the necessary speed to overtake the Peugeot and Cooper's car was handicapped by a leak in the radiator after the completion of 250 miles.

Even with Porporato and Rickenbacher in desperate pursuit, Resta had little to fear. The Peugeot is a car of two virtues. It has both speed and stamina. Attempts to run the wheels off the sturdy French machine were futile, although Cooper and Porporato adopted such tactics time and again. Resta drove with a confidence that at times approached nonchalance.

Before the start, he estimated that an average of 97 miles an hour would carry away first money. He stuck to this pace,

hitting a faster clip when necessity dictated and as his pursuers opened up in a desperate attempt to pass him. His average was consistent but elastic. He always was master of the situation, supreme when his most dangerous competitors tried to drive him to destruction or attempted to steal an unsurmountable handicap should he lie back to rest his motor.

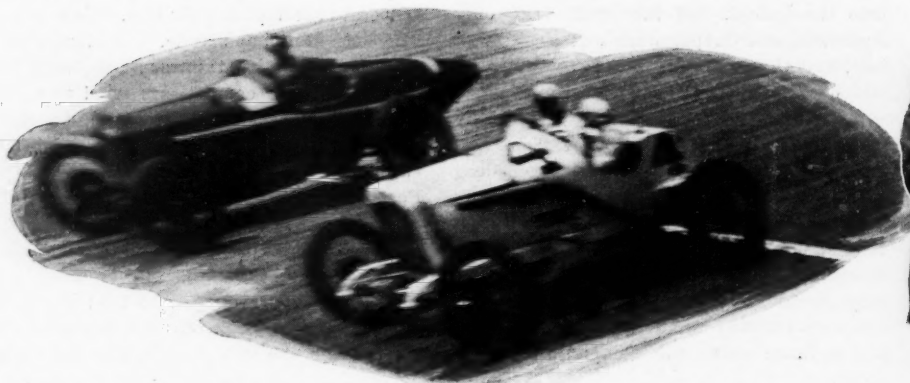
Porporato's Cunning Wasted

Porporato, cunning as he is, was no match for the masterful Resta. Realizing that the Sunbeam was slower than the Peugeot, Porporato tried to lead his rival into dangerous pockets. He drove like a madman on the straightaways in the hopes of beating Resta to the turns and forcing him to take the banks high up. Resta met such challenges with speed and refused to give an inch to the scheming Porporato.

In these desperate brushes, Porporato was reckless and Resta confident. Resta knew the hopes of every driver in the field, knew that they were waiting for him to break up under the high-speed strain, and he was determined that such exasperating tactics of watchful waiting would be for naught. Resta had confidence in the speed and stamina of his car, a confidence that

AND 40-MILE PERIODS OF CHICAGO SPEEDWAY 500-MILE RACE

300 MILES		320 MILES		360 MILES		400 MILES		420 MILES		460 MILES		500 MILES	M.P.H.	NO.	CAR	DRIVER
TIME	POS.	TIME	POS.	TIME	POS.	TIME	POS.	TIME	POS.	TIME	POS.	TIME				
3:03:19	1	3:15:55	1	3:40:24	1	4:04:49	1	4:16:58	1	4:41:12	1	5:07:26.00	97.58	1	Peugeot.....	Resta
3:08:25	4	3:20:26	4	3:44:32	3	4:08:29	2	4:20:32	2	4:44:33	2	5:10:50.45	96.50	11	Sunbeam.....	Porporato
3:07:51	2	3:19:59	2	3:44:30	2	4:09:18	3	4:23:05	3	4:47:22	3	5:11:05.23	96.43	7	Maxwell.....	Rickenbacher
3:08:19	3	3:20:19	3	3:49:27	5	4:14:45	5	4:26:30	5	4:52:04	5	5:15:59.15	95.00	4	Stutz.....	E. Cooper
3:09:38	5	3:22:28	5	3:47:48	4	4:12:02	4	4:25:47	4	4:51:22	4	5:18:11.58	94.30	17	Sunbeam.....	Grant
3:12:38	7	3:24:43	6	3:50:33	6	4:16:24	6	4:28:31	6	4:54:20	6	5:20:09.86	93.90	3	Stutz.....	Anderson
3:11:06	6	3:25:41	7	3:50:52	7	4:16:27	7	4:29:05	7	4:57:08	7	5:23:05.67	92.90	12	Delage.....	Chevrolet
3:20:29	10	3:32:50	8	3:57:31	8	4:21:51	8	4:33:57	8	4:58:26	8	5:25:12.61	92.20	9	Peugeot.....	Burman
3:20:39	10	3:33:12	9	3:57:57	9	4:24:19	9	4:37:54	9	5:03:08	9	5:28:33.88	91.30	19	Dusenber.....	Alley
3:21:13	11	3:34:12	10	4:01:17	10	4:27:06	10	4:40:05	10	5:05:58	10	5:32:10.42	90.40	23	Sebring.....	J. Cooper
3:26:14	12	3:39:45	12	4:06:43	12	4:33:22	12	4:46:33	12	5:12:51	11	5:39:19.28	88.41	22	Peugeot.....	Babcock
3:19:01	8	3:35:06	11	4:04:33	11	4:32:01	11	4:45:32	11	5:21:30	12	5:59:59.85	83.33	10	Sunbeam.....	Van Raalte
3:53:25	15	4:06:24	15	4:32:53	15	5:01:36	15	5:14:53	14	5:41:29	13	Flagged	.....	5	Maxwell.....	Carlson
3:38:47	13	3:54:10	14	4:25:21	13	4:56:39	13	5:12:13	13	5:43:28	14	Flagged	.....	27	Maxwell.....	Orr
3:39:40	14	3:53:33	13	4:27:20	14	4:59:39	14	5:15:22	15	5:47:18	..	Flagged	.....	30	Mulford.....	Mulford
Out on	294th	h mile.	Clutch trouble.	.....	..	.....	..	.....	..	.....	..	.....	.....	21	Dusenber.....	Haupt
Out on	280th	h mile.	Connecting rod bearing failed.	.....	..	.....	..	.....	..	.....	..	.....	.....	15	Dusenber.....	O'Donnell
meeting rod bearing failed.	.....	..	.....	..	.....	..	.....	..	.....	..	.....	.....	.....	31	Sunbeam.....	Limberg
.....	..	..	.....	..	.....	..	.....	..	.....	..	.....	.....	.....	2	Stutz.....	Wilcox
.....	..	..	.....	..	.....	..	.....	..	.....	..	.....	.....	.....	20	Mercer.....	Henning
.....	..	..	.....	..	.....	..	.....	..	.....	..	.....	.....	.....	24	Ogren.....	Chandler



RESTA'S PEUGEOT AND COOPER'S STUTZ FIGHTING FOR THE LEAD

many of his rivals lacked. He refused to take chances. Near the end of the heart-breaking struggle, he grew even more cautious and permitted Porporato and Cooper to pass him in the furious drives for the inside position at the turns. He could afford to lie back. His lead was safe provided his car did not play him false.

Stop Arouses False Hopes

When only 4 miles from his goal, Resta was forced to stop at his pits. When his rivals saw the blue Peugeot slow down and glide over the concrete portion of the track, they were spurred on to greater speed. For a fraction of a minute, they thought that the stop, the fatal stop that they had waited for, had come and that the French car was a victim of its own record-break-

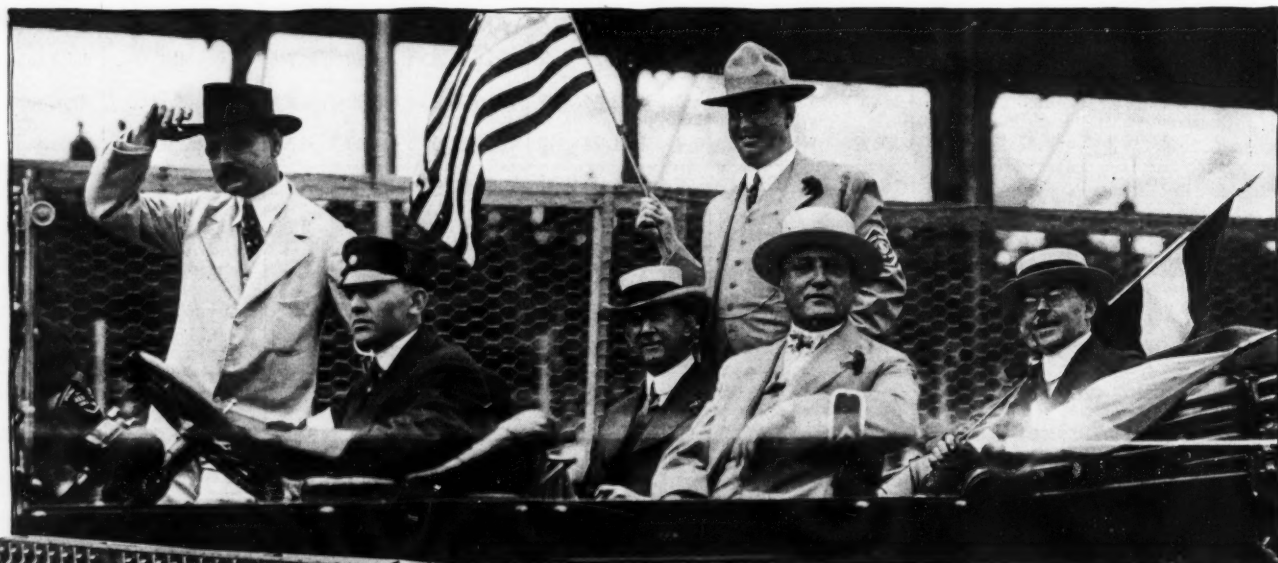
ing speed. Their hopes were shattered when the Peugeot pitman changed a wheel in 25 seconds and Resta resumed his conquering flight.

As was generally predicted, today's contest was a test of motors rather than a test of tires. This was especially true after the first 100 miles had been covered, for in the last four centuries there were fewer stops for new wheels than in the first 100 miles of the time massacre. This phenomenon, like all phenomena, is difficult to explain, but it probably was due to the excessive speed made in the first ten laps of the track and the damp condition of the course. When the average of the leaders was reduced from 105 to 98 miles an hour and the sun dried up the boards, rubber lasted longer and the continual stops of the

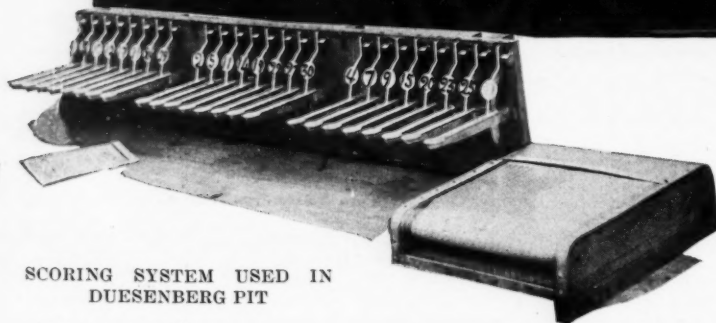


MAYOR THOMPSON OF CHICAGO RUBS EARL COOPER'S HAND WITH HIS GOLD BILLIKEN FOR LUCK

white-heat test of high speed as well as they did is one of the remarkable chapters in the Mercurian epic that was penned at the Chicago speedway today. The opinion was common that before the checkered flag dropped, half the field would be eliminated and that the Chicago race would be



SPEEDWAY OFFICIALS START ON INSPECTION CIRCUIT OF TRACK BEFORE START OF RACE



SCORING SYSTEM USED IN DUESENBERG PIT

leaders to change wheels, which featured the first century, suddenly halted.

That the engines stood the

as hard on cars as was the Indianapolis classic. This did not prove the case, however, as only six entries out of a total of twenty-one starters were permanently docked.

Three of the six cars which suffered incurable ailments were eliminated before the first 100 miles were completed, the

Ogren breaking a bevel pinion housing on the twelfth lap, the Mercer Special being out with ignition trouble on the twenty-first lap and Wilcox's Stutz sustaining a broken piston on the forty-fifth lap.

The other three unfortunates were interned for repairs before the three hundredth milestone was passed by the flying leaders, Limberg's Sunbeam having a loose connecting rod bearing on the one hundred and tenth lap, O'Donnell's Duesenberg burning out a bearing on the one hundred and fortieth lap and Haupt's Duesenberg suffering clutch trouble on the one hundred and forty-seventh lap.

Laurel for Harry Grant

There were heroes other than Resta, the winner, in today's sensational gasoline derby. Harry Grant shares with the swarthy-skinned victor the honors of the day, for his non-stop achievement is as epoch-making as the record-smashing time of the conquering Italian. In the annals of speedway racing, no driver before today ever drove 500 miles without a stop, although at Indianapolis several cars have completed the five centuries without a change of tires. The best previous nonstop record was that of Barney Oldfield, who covered 301.81 miles at Corona last Thanksgiving day without a halt at an average speed of 86.2 miles per hour.

Grant earned the title of the king of perpetual motion of the gasoline circuit, but was forced to coast to his throne with-



GOVERNOR EDWARD F. DUNNE OF ILLINOIS AND FAMILY WATCHING RACE FROM
EXECUTIVE BOX IN GRANDSTAND

out the bark of his motor heralding his coronation. The tanks of his Sunbeam were empty when he started on his final lap of the 250 and only the car's tremendous momentum carried him over the wire where Starter Wagner waited for him with the checkered flag.

an old-timer and noted for its fuel economy rather than for its speed. The tanks have a capacity for 50 gallons of gasoline and 7 gallons of oil and although they were full when Grant started on his remarkable dash, they were drained of their last drop when he coasted over the wire.

COMPARATIVE TIMES FOR CHICAGO, INDIANAPOLIS AND BROOKLANDS TRACKS

Distance	Chicago	Indianapolis	Brooklands
100 miles . . .	1:00:28.03 99.05 m.p.h.	1:07:30.45 90.89 m.p.h.	0:55:35.55 107.93 m.p.h.
200 miles . . .	2:02:17.67 98.10 m.p.h.	2:14:29.58 89.22 m.p.h.	2:05:06.28 95.92 m.p.h.
300 miles . . .	3:03:19.17 98.20 m.p.h.	3:19:32.87 90.20 m.p.h.	3:07:45.46 95.87 m.p.h.
400 miles . . .	4:04:49.96 98.00 m.p.h.	4:27:17.17 90.41 m.p.h.	4:12:15.08 95.14 m.p.h.
500 miles . . .	5:07:26.00 97.58 m.p.h.	5:33:55.51 89.84 m.p.h.	5:16:40.01 94.75 m.p.h.

Grant's hands never left the steering wheel of the Sunbeam for 5 hours and 18 minutes. He sucked oranges, drank water and ate hard boiled eggs while traveling at a speed of 95 miles per hour. Compared to Resta's Peugeot, the three Stutzes and the two Sunbeams imported from England for the Indianapolis and Chicago race, his car is



Tires Show Little Wear

The Silverton tires, with which Grant's car was equipped, showed very little wear. The front casings looked almost as good as when they left the factory and only a small portion of the tread had been ground



HARRY GRANT, THE SUNBEAM DRIVER, WHO ESTABLISHED A WORLD'S NONSTOP RECORD, AND THE COLOSSAL SCOREBOARD AT THE CHICAGO SPEEDWAY



BILLY CARLSON, IN A MAXWELL, PASSING IN REVIEW BEFORE THE STANDS

off the rears. The exhaust pipe of the car was broken, the rear half hanging precariously near the track, and several other minor parts were in equally as bad shape.

Another hero of the first race on the Chicago speedway is Bob Burman, who showed his gameness in a new way this morning. About an hour before the time for the start of the race, Burman discovered that a piston had seized during his demonstration lap and that it would be impossible for him to compete unless he replaced the burned piston and cleaned the scored cylinder.

Toll and Trouble for Burman

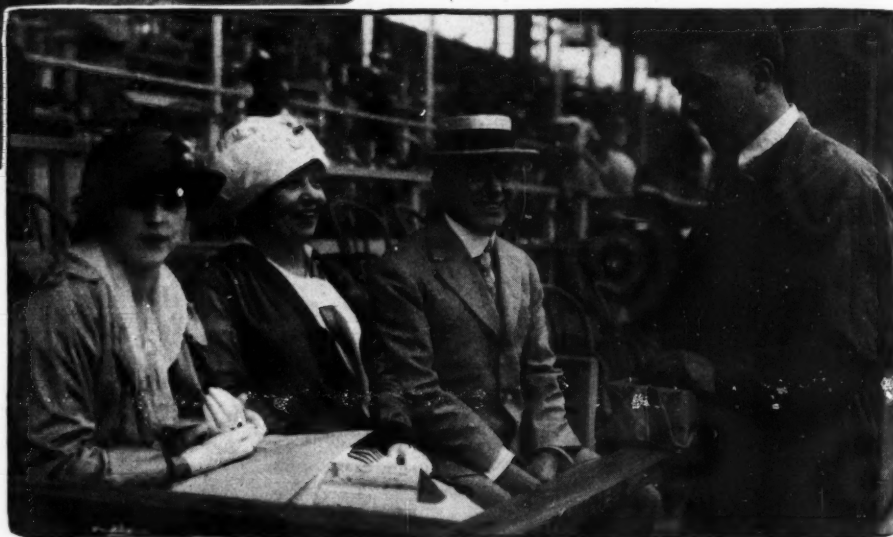
With the hearty consent of the other drivers, Referee Vissering postponed the time of start from 10 to 10:30 o'clock in order to give Burman an opportunity to make repairs on his injured Peugeot. With three mechanics, Bob removed his motor from the chassis, put it on a block in front of his pit and started to work. For concentration of energy and lightning repair work, Burman and his helpers established a new world's record. There were no seconds wasted, no motion lost in the exacting labor of dismantling the motor, cleaning the cylinder by lapping in a dummy piston with coarse emery and replacing the seized piston.

Burman had his car on the starting line at 10:20 o'clock and was sent away with the other space gourmands 10 minutes later. He never drove as conservatively as today, perhaps because he feared to take chances with the hasty repair.

Porporato's gameness also was put to the test, for he drove the entire 500 miles with poisonous exhaust gases spitting in his face and his head wreathed in the malodorous smoke of castor oil. This was caused by discharges from the breather pipe and leaks about the exhaust manifold, the smoke being forced through the driver's compartment by an air draught.

second, and had it been the finish instead of the start of the contest it would have been the deadliest dead heat in the history of all sport from the time of the ancient Greeks to the present day.

The dedication of the Chicago board oval and the record-smashing victory of Dario Resta was witnessed by more than 80,000 spectators, who at the close of the day of sensations were convinced that the local track is the safest and fastest motor car course in the world. They saw the birth of a new epoch in motor car racing.



DARIO RESTA, WINNER OF THE RACE, VISITS WITH HIS WIFE JUST BEFORE STARTING THE SENSATIONAL DRIVE OF TRIUMPH

When asked how he endured this torture for more than 5 hours, he said that he stuck his head to one side periodically and filled his lungs with sufficient fresh air to last him for $\frac{1}{2}$ mile.

Twenty-one of the twenty-four cars that qualified in the elimination trials accepted the issue when Starter Wagner sent the field away. The three Knight-motored entries, the F. R. P. cars, were withdrawn yesterday when their designer, Finley R. Porter, and their drivers decided that they had no chance of finishing. It was found impossible to give them oil enough without causing so much smoke as to be dangerous to the drivers of other cars. Rather than jeopardize his competitors, Porter withdrew his entries.

Limberg's Sunbeam, which was barred under the A. A. A. three-car rule, although it made the required qualifying speed in the elimination trials, was permitted to start by the consent of officials and drivers.

The flying start was perfect and most spectacular. As at Indianapolis, the cars were lined up in rows of four each and were sent around the track for a preliminary lap at a speed of 75 miles per hour. Resta had the pole in the first tier and was flanked by the three Stutzes. No four race horses ever broke the barrier in as perfect alignment as the four thoroughbreds of steel. The front wheels of the first four cars struck the wire at the same

ing, an epoch that promises to be featured by the crowding of 500 miles within 5 fleeting hours before it is a year old.

It was a notable assemblage. Society was out. Governor Edward F. Dunne and Mayor William Hale Thompson motored to the track to pay the monarchs of velocity homage. The monster grandstand, stretching for $\frac{1}{2}$ mile along the home stretch, was ablaze with color, and the parking spaces were black with motor cars. The throng, the noise, the color, the thrills reminded the sportsmen of the old school of the gala day that is now but a memory, the day when all Chicago paid tribute to thoroughbred and jockey and packed the paddock and stands of Washington Park to cheer the winner of the American Derby.

Crowd Not Morbid

It was not a morbid crowd. Had it been it would have dispersed sadly disappointed, for there were no accidents. The only mishap of the day was when Louis Chevrolet's Delage blew a rear tire in coming off the north turn into the home stretch and skidded into the inside safety wall of the track. The veteran fought his wild mount and conquered it.

The Chicago speedway now is a civic institution. The astounding records established today and the unqualified success attendant upon its dedication has made it so.

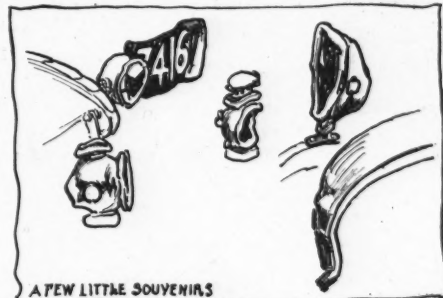
Effects of Bacilli Velocitas on the High-Speed Artist



ON THE CURVES
PORPORATO ALWAYS
AIMED HIGH



PORPORATO
DIDN'T MIND
THE SMOKE
THOUGH

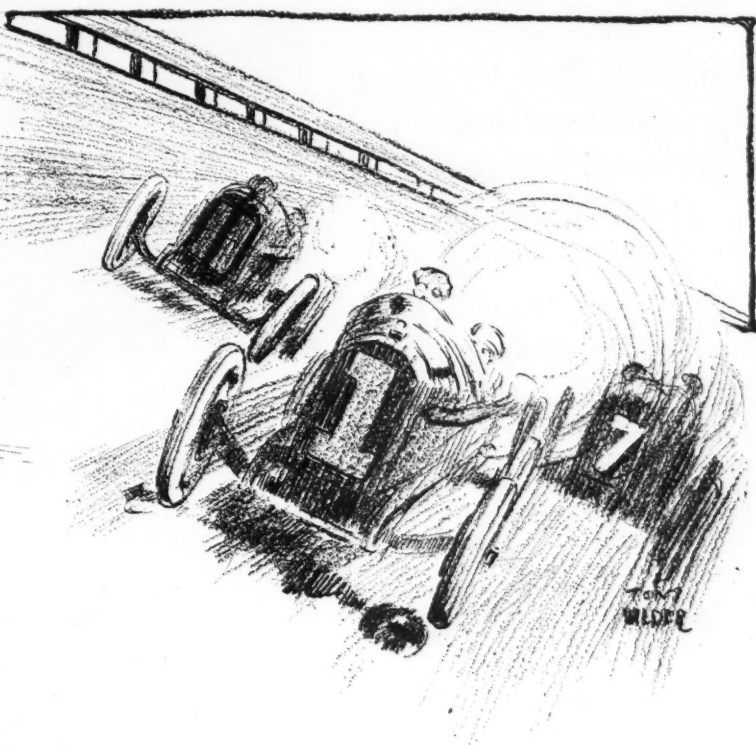


A FEW LITTLE SOUVENIRS

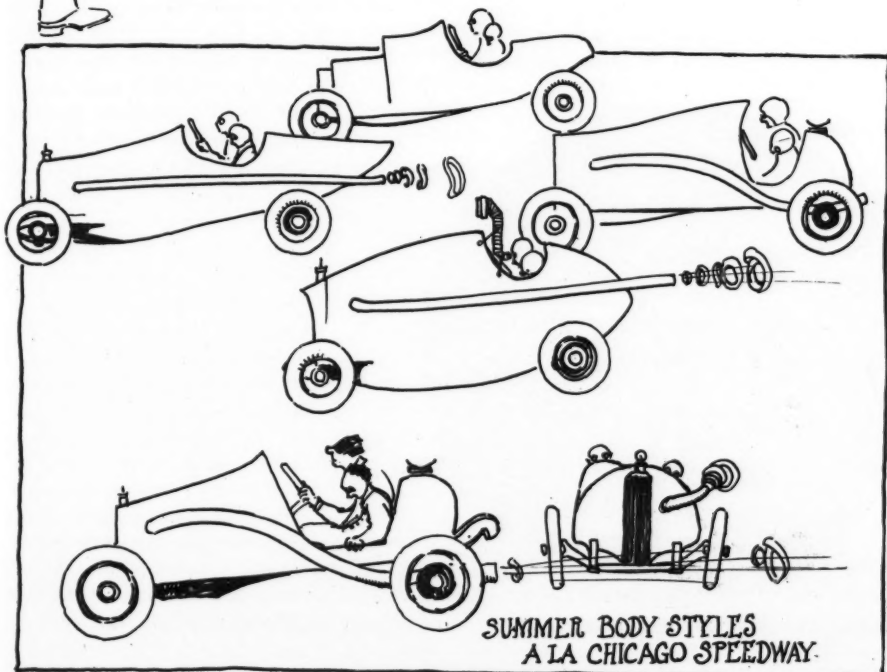
I RECKON THE FOLKS
UP HOME 'LL BE GLAD
T'SEE SOME GOOD
PICTURES 'O THEM
RACERS.



BROWNIE



TOM
WILDER

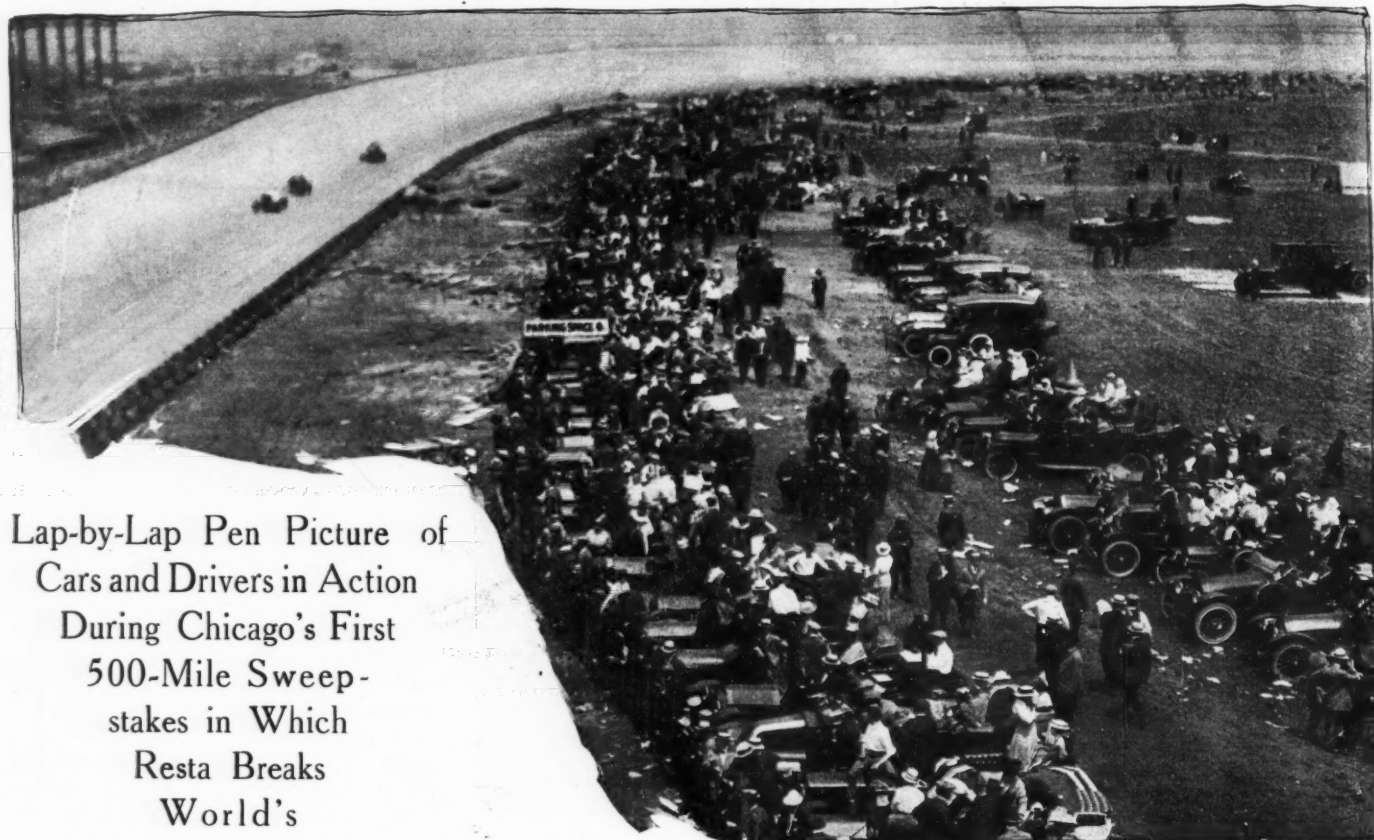


SUMMER BODY STYLES
A LA CHICAGO SPEEDWAY

LISTEN! DIS GUY RESTA
GOES AROUND IN ABOUT 1-14.
NOW HOW FAST D YA TINK
DAT IS? MUST BE 60 MILES
'NOUR. HUH?



From Starting Signal to Checkered Flag--How They Ran



Lap-by-Lap Pen Picture of
Cars and Drivers in Action
During Chicago's First
500-Mile Sweep-
stakes in Which
Resta Breaks
World's
Records

EAST FIELD AND TRACK AS SEEN FROM THE JUDGES' STAND

8 A. M.—**S**PEEDWAY PARK, Chicago, June 26—Fire spits from throbbing motors. Pampered mounts are crawling from their garages toward the opening on to the 9,000,000 feet of two-by-fours that 2 hours hence will reverberate with the roars of one hundred pulsing, popping cylinders—four to a car with two exceptions—Grant's and Limberg's Sunbeams—each a six. Drivers and mechanics are on the qui vive for the battle of brains, brawn, grit and steel.

8:05—They're coming now. Already the grand stands are filling; the infield is dotted with cars that before 10 o'clock will be in their allotted places. Thousands virtually slept with their clothes on last night that they might get to the track in time to see the initial move of the Homeric struggle.

8:12—The first accident occurs. The press of traffic through the tunnel at the northwest corner of the track threw a woman from the walk in front of a motor car. She suffered a bruised leg and

By William K. Gibbs

has been rushed to the field hospital.

8:15—Now that they are all lined up at their pits, Referee Vissering and Chairman of the Technical Committee Hibben are calling the cars out for their brake and reverse tests. They take the tests one by one.

8:16—Resta comes first, rolling down the track at 20 miles per hour.



ANDERSON IN STUTZ PASSING STANDS

Vissering stands with his arm raised and at the drop of his arm as Resta comes even with him the Italian applies the brake, stopping the car within a few feet. He then backs up to prove he has a reverse gear. This is repeated for each car in the order of number.

8:18—Dario Resta just brought his blue Peugeot, bearing No. 1, to the starting line after having made a circuit of the track.

Wilcox, Anderson and Cooper, in Stutzes, slip into place in the front row beside Resta.

8:20—Other cars are beginning their circuit of the track after having passed the final inspection by the technical committee, which has pronounced brakes in good working order, and other mechanism has received its o. k.

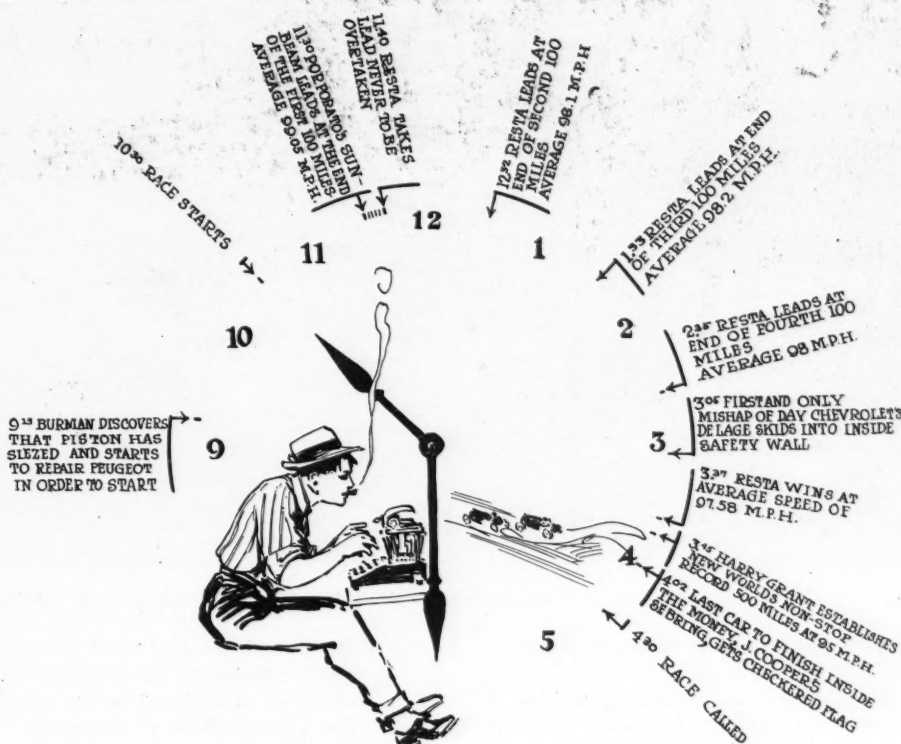
8:30—There is a dramatic spectacle being staged in front of one of the pits. Grim determination is seen on the faces of the actors. The crowd in the stands and the infield, which now numbers several thousand, is unaware that a few men are making Herculean efforts to do in the next 90

minutes what every driver has been doing in the last 2 weeks—put his car in shape for the grind. The star of the drama is Bob Burman and the rest of the cast is made up of his mechanics and pitmen.

8:45—The cars have all lined up in their order at the starting line—that is, all but Burman's Peugeot, which has the cylinder block lifted at the pits. The cars are lined up in six rows of four each, Resta at the pole in the first row, Wilcox beside him, Anderson and Cooper in Nos. 3 and 4 Stutz to the outside. Fifty feet behind the first row is the second, with Carlson in a Maxwell at the pole.

9:00—The technical committee is making the rounds of the cars, two of them taking samples of gasoline from the tanks for chemical analysis, two others checking up the accessory equipment and another pair examining the official stamps on the motors and frames to make sure that the engines and cars are the same as those which they have examined and measured during the previous week.

9:16—Resta leads off the parade of nations, his mechanic waving the flag of France. Wilcox, Anderson and Cooper, to the strains of the Star Spangled Banner, follow next in order with Old Glory floating over the rear ends of their cars. Next comes Carlson's Maxwell, also carrying the American flag. Van Raalte and Porporato follow in Sunbeams with the Union Jack. Chevrolet's Delage with the French tri-color, O'Donnell's Duesenberg, Henning's Mercer and Haupt's Duesenberg glide away with American colors flying. Grant in a Sunbeam carried the colors of America over the Union



CLOCK OF EPISODES FEATURING THE CHICAGO RACE

Jack. Babcock followed in a Peugeot with the French flag, while the other contestants, J. Cooper, Chandler, Orr and Mulford at the wheel of the Sebring, Ogren, Maxwell and Mulford Special respectively followed next in the order named carrying the American flag. Limberg's Sunbeam brings up the rear with the Union Jack flying.

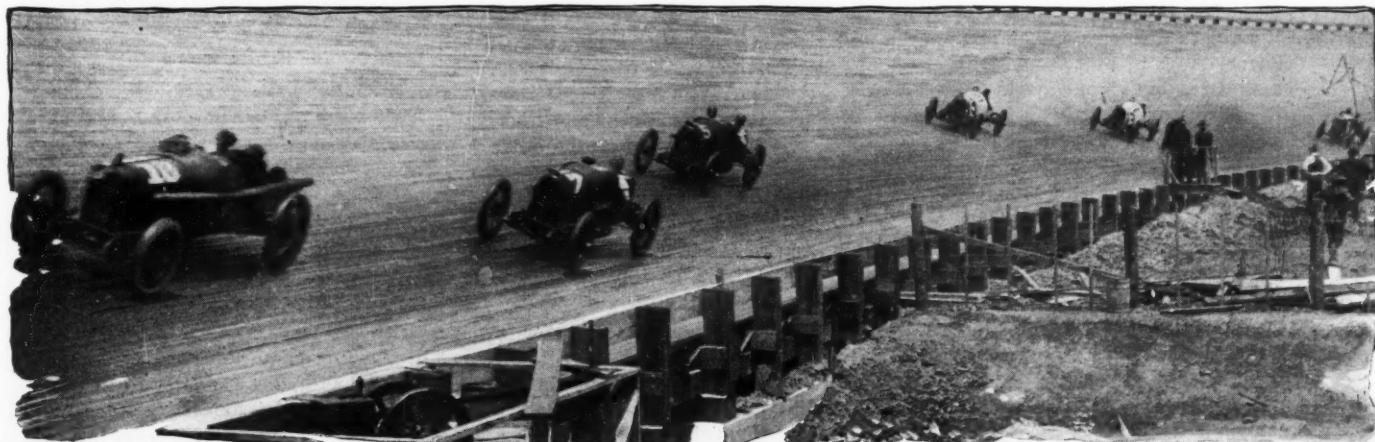
9:25—It is announced that the start will be delayed 30 minutes, for Bob Burman to get his Peugeot repaired. The announcement brings cheers from the crowd. This answers the question passing from lip to lip, "Where's Burman's Peugeot?" for it was noted that as the cars stood at the line in their order of speed rank during the

eliminations one vacant chair showed where No. 9 should be.

9:44—Mayor Thompson and the announcement that Burman has his motor ready share honors in the cheering and blare of horns which range over almost every tone from A flat to high C. Burman tore his car down to the crankcase, put in new pistons and finished the work in 74 minutes.

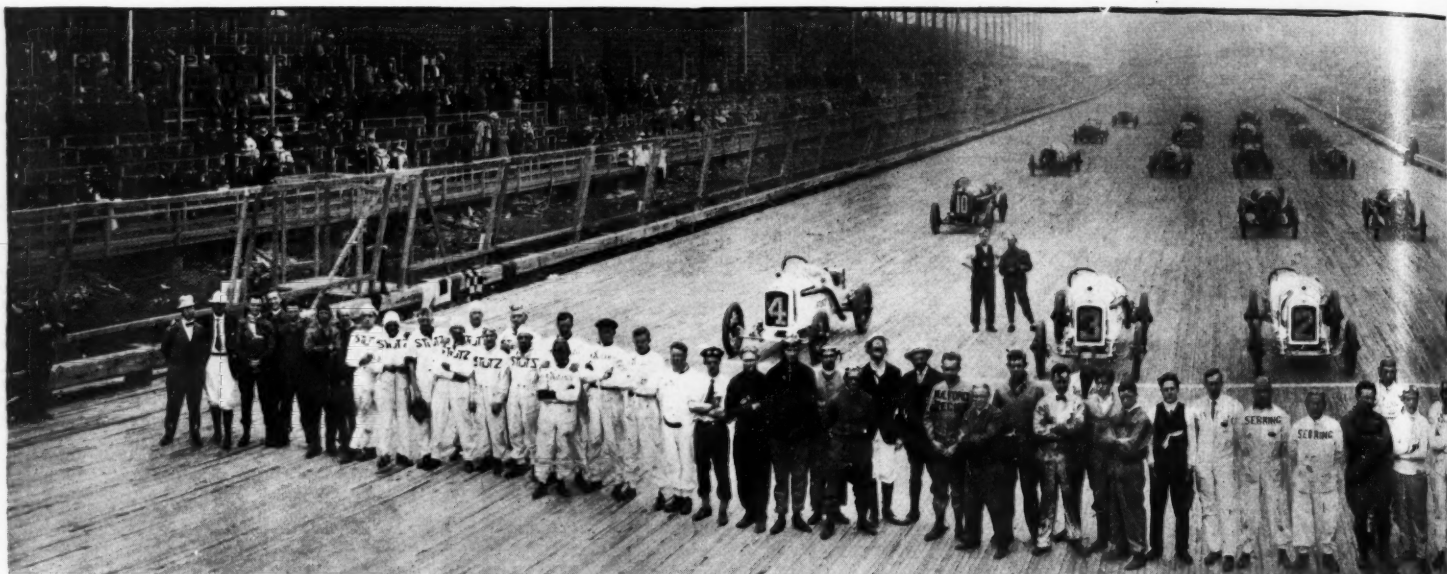
10:00—Burman will be ready in 15 minutes. Race will start at 10:30 o'clock. Officials, drivers and mechanics line up across track to be photographed. Movie and camera men furnish most of action now.

10:08—Harry Vissering, referee, in a Packard, comes on ready to make a circuit of the track.



VAN RAALTE, RICKENBACHER, CARLSON, ALLEY AND

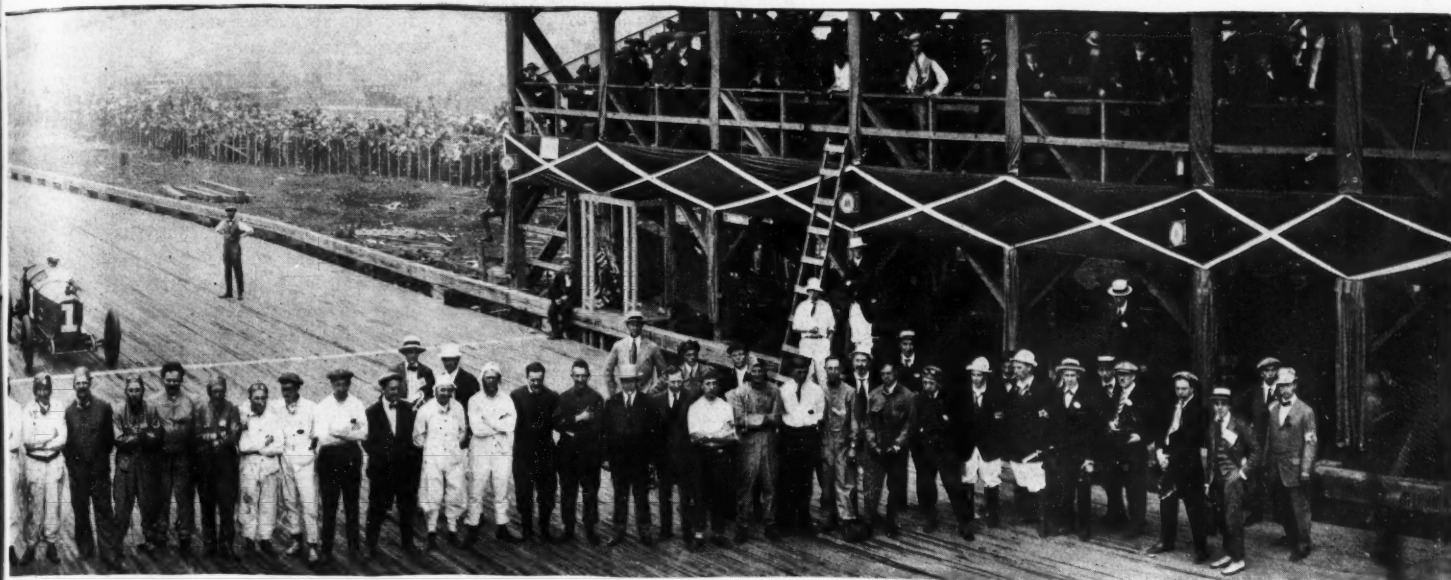
O'DONNELL TAKING THE TURN AT EAST END OF TRACK



CARS, DRIVERS, MECHANICIANS AND OFFICIALS LINED UP AT THE STARTING LINE JUST PRIOR TO THE

SIGN

- 10:12—Burman now putting hood on his car.
- 10:14—Burman gets away, making a circuit of the track followed by official car, bearing Mayor Thompson and officials of the speedway.
- 10:16—Burman gets into his location. No longer is there a vacant place in the lineup. Drivers and mechanics crowd about the Peugeot with congratulations for Burman, but he pauses only a minute, then is off again to test out the new pistons.
- 10:28—Motor purrs—drivers set—
- 10:28.15—They're off!!
- 10:30—With foot on the throttle they spurt across the line and begin to eat space.
- 10:31.50—Resta crossing the tape after the first lap 20 yards in the lead.
- 10:38—Resta is running consistently at 107 miles an hour, with Howdy Wilcox drawing close, not more than two car lengths separating them.
- 10:40—The Ogren makes the first stop at the pits. Resta and Wilcox cross the tape hood to hood.
- 10:44—Henning's Mercer stops at pits.
- 10:47—Cooper stops at pits for a right rear tire, but is away in 25 seconds.
- 10:48—Anderson stops at pits for a right rear tire. Wilcox and Resta are averaging 105 miles an hour. Wilcox takes the lead, with Resta stopping at the pits in his thirty-second mile for a right rear tire. Wilcox gains three-quarters of a lap on him, although Resta makes the change in 15 seconds.
- 10:52—Wilcox loses lead by having to change a right rear tire that looks much like the back of a maddened cat as he drives up before the pits. He gets away just as Resta makes up his lost time. Time of change 30 seconds.
- 10:54—The Ogren makes another stop at the pits. The field is bunched between the thirty-sixth and fortieth mile, the order being Resta, Alley, Burman, E. Cooper, Rickenbacher, O'Donnell, J. Cooper, Mulford, Anderson, Porporato, Van Raalte, Chevrolet, Grant, Carlson, Haupt, Alley and Wilcox. The others are touring.
- 10:56—Alley's Duesenberg shows faulty ignition and he stops at pits.
- 11:00—Fifty miles of the race are over for Resta and also for Cooper's Stutz.
- 11:04—Van Raalte stops at pits for a right rear tire. It looks like the track has a peculiar influence on right rear tires, as all changes so far have been on that wheel.
- 11:09—Henning stops at pits.
- 11:10—The Ogren is out of the race in its twenty-fourth mile. Wilcox stops at pits for right rear tire. Porporato leads at 64 miles, Resta, Cooper, Anderson, Burman, Van Raalte, O'Donnell, Chevrolet, Grant and Rickenbacher following in the order named.
- 11:14—Resta loses a mile of his lead at the end of his 74th mile by a stop at the pits for a right rear tire, Wilcox now being only a lap behind him.
- 11:22—Anderson stops at pits for a right rear tire.
- 11:25—Porporato, Cooper, Anderson and Resta, Burman and Van Raalte lead the field. Carlson breaks the spell of right rear tire changes, stopping for a right front change.
- 11:26—The crowd is watching the fray between Resta, Porporato and Cooper. These three are fighting hard for the first prize money of Chicago's 5-century derby—\$1,000 for the first car to finish 100 miles.
- 11:30—Resta crosses the tape, finishing his ninety-eighth mile. Wilcox stops at the pits, has engine trouble, in his ninetieth mile. Rickenbacher stops for a right rear tire and O'Donnell stops for the first change during the race of a left side tire—a rear. Porporato stops at pits for a right rear tire. He has just won \$1,000 by being first to finish 100 miles; time, 1 hour, 28.03 seconds. Cooper is 38 seconds behind Porporato, and Resta third, although only a matter of 90 seconds separates the first three. Cooper stops for a right rear tire, just as his teammate, Wilcox, drives his car off the track. Broken piston puts the latter out of the race.
- 11:55—Van Raalte stops for a right rear tire and gas.
- Noon—Resta and Porporato are even with 138 miles gone. Cooper is less than a lap behind. Rickenbacher and Burman each have finished their one hundred and thirty-sixth mile, with Carlson and Van Raalte less than a lap behind them.
- 12:03—Burman makes his first stop—for supplies—it being his one hundred and forty-fourth mile. Resta has finished his one hundred and fiftieth mile, as has Porporato. They lead the field



SIGNAL THAT SENT THE SAVANTS OF MERCURY IN QUEST OF INTERNATIONAL SPEED RECORD

by almost 4 miles. Haupt's Duesenberg stops 3 minutes on account of ignition troubles.

12:11—Henning's Mercer out of the race. Burman gets away again and Haupt's Duesenberg stops for a right rear tire. At the end of the one hundred and sixtieth mile Resta was leading

with an average of 99.26 miles per hour—elapsed time 1 hour, 36 minutes and 44 seconds.

12:16—Porporato stops for a right front tire in his one hundred and seventieth mile, taking on gas and oil at the same time. Carlson's Maxwell stops for water and gas.

12:20—Chevrolet in the Delage, Anderson in a Stutz and Rickenbacher in a Maxwell each have 168 miles to their credit; Resta leading with 178 miles.

12:22—Resta stops for a right rear tire, but gets away in less than 30 seconds. He has finished his one hundred and eightieth mile

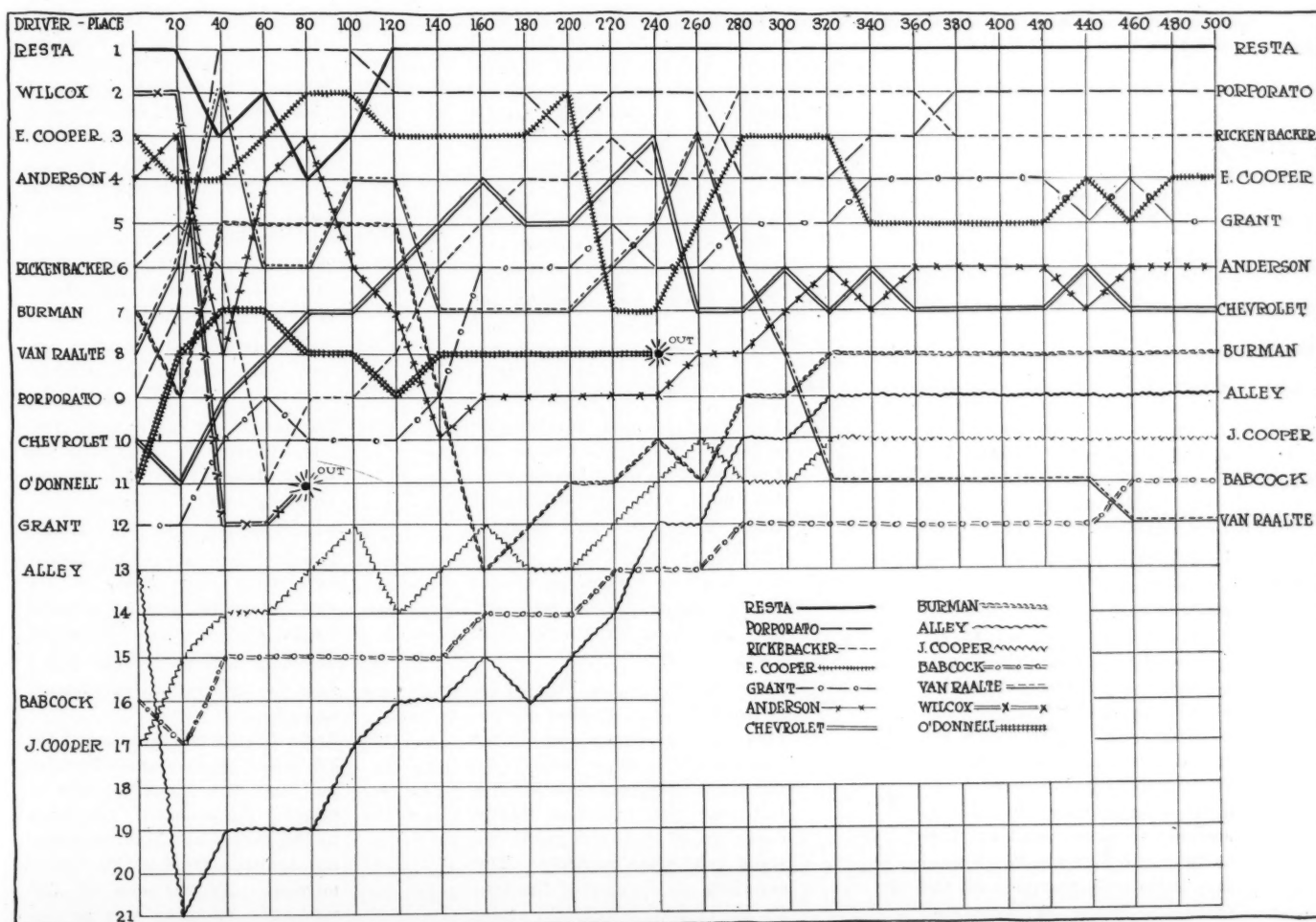


CHART SHOWING POSITIONS OF CARS IN CHICAGO RACE AT COMPLETION OF EACH 20 MILES



CHEVROLET AND HIS MECHANIC IN DELAGE

in 1 hour, 49 minutes and 32 seconds, averaging 98.6 miles per hour.

12:30—Resta still leading at 194 miles. The

others, with their rank at this time are E. Cooper, Porporato, Rickenbacher,

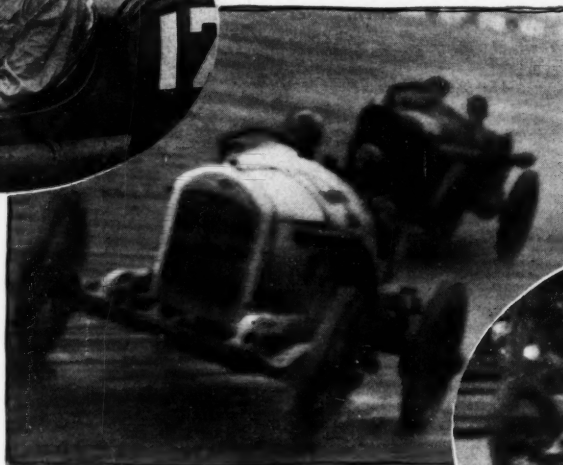
Chevrolet, Grant, Van Raalte, O'Donnell, Anderson, Burman, J. Cooper, Babcock and Alley. Van Raalte, 184; Anderson, 182; Cooper, 182; Rickenbacher, 182; Chevrolet, 178; Limberg, 178; J. Cooper, 172; Burman, 172.

12:33—Porporato stops for right and left front tires, making the changes in 67 seconds.

12:40—Seven cars have finished 200 miles or over. Resta leads with 212; Cooper second with 208. Old Sol has come out and the weather is ideal. O'Donnell stops at the pits for supplies.

12:45—Limberg's Sunbeam stops for supplies; also Earl Cooper's Stutz and Anderson's Stutz. At the end of 200 miles the contestants ranked in this order: Resta, Cooper, Porporato, Rickenbacher, Chevrolet, Grant, Van Raalte, O'Donnell and Anderson. Haupt's Duesenberg, which has been out for some time, expects to get back in the race.

12:56—Resta has a comfortable lead and does not seem to be trying to hit the pace he set in the eliminations. He is driving consistently and barring anything other than tire trouble looks like the one to pull down the big end of the purse. Fewer tires are being changed than early in the race, the drivers seeming to have found out how to take the turns without signing the death warrant of the casings. Resta is averaging better than 97 miles per hour.



COOPER AND PORPORATO IN BRUSH ON THE TURN

and Anderson, in the order named.

At the 240 miles Resta leads, elapsed time 2 hours, 26 minutes and 29 seconds, an average of 98.3 miles per hour.

1:04.15—Resta finishes his two hundred and fiftieth mile. Porporato in a Sunbeam is only a lap behind. Sixteen cars now are running, all having finished better than 200 miles. Porporato's Sunbeam and Cooper's and Anderson's Stutzes are serious contenders for Resta's position.

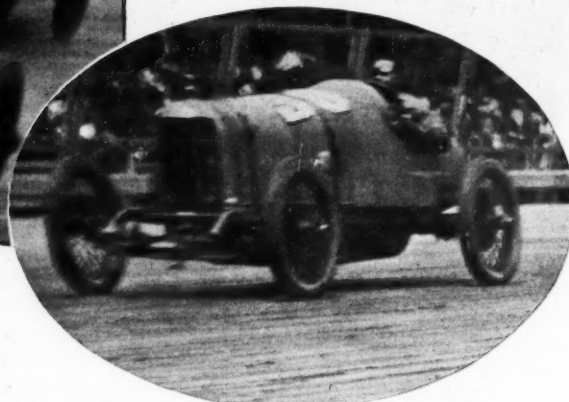
1:09—Resta in his two hundred and fifty-fourth mile stops for supplies. Carlson has stopped and raised the hood of his Maxwell. Chevrolet stops in his two hundred and forty-eighth mile for a right front tire. Carlson seems to be having trouble with his car. Chevrolet takes on gas and gets away in less than a minute.

1:17—Bob Burman makes his second stop at the end of his two hundred and forty-sixth mile. Gets away at 1:20.

1:21—Four cars are at the pits, O'Donnell, Van Raalte, Porporato and Carlson, the latter having been there nearly 15 minutes. Porporato changed a left rear tire and Van Raalte came up to the pits with his right rear gone entirely. The standing at the end of the two hundred and seventieth mile was Resta, 2 hours, 40 minutes

and 1 second, average 97.5; Porporato, 2 hours, 41 minutes and 16 seconds, average 96.76 miles per hour; Rickenbacher, 2 hours, 42 minutes and 4 seconds, average, 96.2 miles per hour.

1:25—Rickenbacher is 4 minutes and 54 seconds behind Resta when the latter has done 280 miles. Resta's time at his two hundred and eightieth mile was 2 hours, 51 minutes and 51 seconds, average 97.73 miles per hour. Anderson stops at the pit for a right rear tire in his two hundred and seventy-eighth



RALPH MULFORD IN HIS MUL FORD SPECIAL

mile. The Duesenberg is still out.

1:30—Joe Cooper's Sebring stops for gas and a right rear tire.

1:31—Haupt's Duesenberg is back in the race, but it seems hopeless as he is 170 miles behind Resta. Haupt had covered 114 miles when he stopped for repairs.

1:35—Officials just announce that the world's record for 200 miles has been broken by Resta. O'Donnell has stopped.

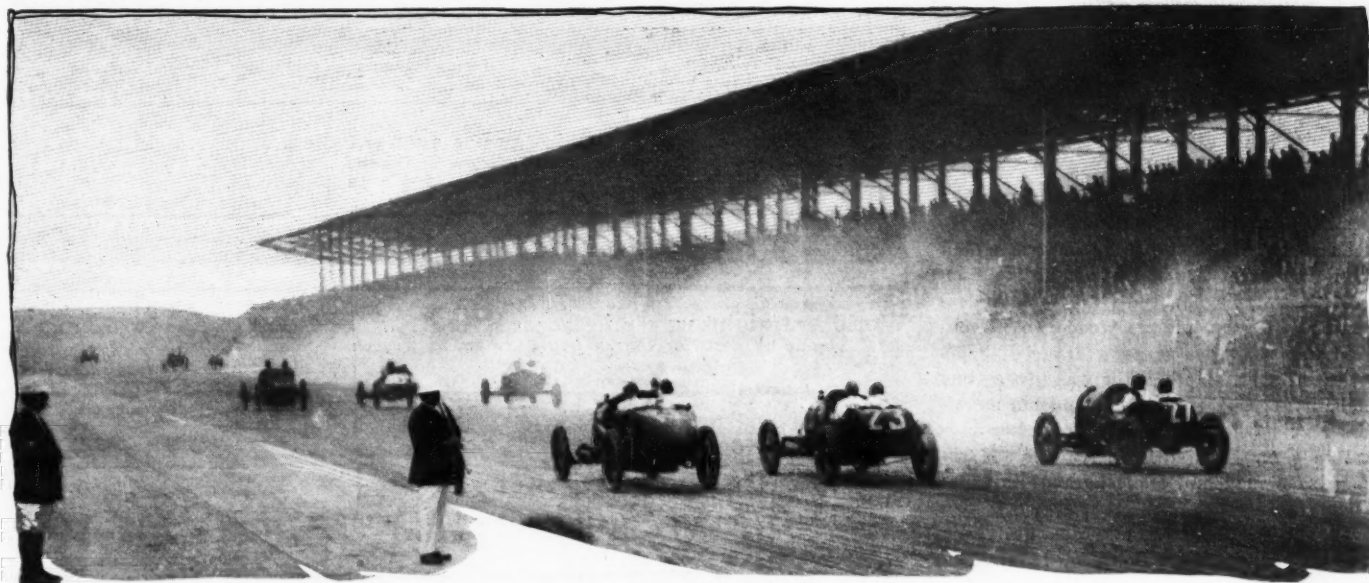
1:37—Resta just passed the third century, with Cooper and Rickenbacher each at 298 miles.

1:39—Burman stops for a right rear tire. Carlson still is at the pits—has been there 30 minutes now; gets away at 1:40.

1:46—Rickenbacher now in second place, 312 miles. Van Raalte gets away after being at the pits 5 minutes and 33 seconds. Resta has covered 318 miles.

1:50—Resta is leading in his 322nd mile by 2½ laps, Rickenbacher second.

1:52—Resta breaks world's record for 320 miles by averaging 98 miles per hour flat; time, 3 hours 15 minutes 6.5 seconds. Orr back in the race. Van Raalte is having ignition trouble, his motor missing. At the end of 300 miles the standing was as follows: Resta, Rickenbacher,



AT THE END OF THE PACING LAP RESTA SPURTS INTO THE LEAD

Earl Cooper, Porporato, Grant, Chevrolet and Anderson. Chevrolet stops for a right front tire. Grant in a Sunbeam has not made a stop at the pits.

- 1:58—Earl Cooper stops for oil and gas.
- 2:00—Resta has finished his 340th mile, time 3:28:5, average 98.5 miles per hour. Anderson is at the pits for supplies. Van Raalte's Sunbeam misses fire worse each time around, but he seems to be inclined to run as long as even one cylinder is working. The order of the leaders now is Resta, Rickenbacher, Porporato, Grant and Cooper.
- 2:10—Mrs. Dario Resta seems nervous. She gets up and sits down in the paddock box, watching every move of the pacemaker.
- 2:11—At the end of 340 miles Resta's average was 98.5; Rickenbacher, second, 96 flat; Porporato, third, 95.99; Grant, fourth, 95.62.
- 2:16—Resta finishes his 366th mile; time 3:40:35, average 98 miles per hour. The probable winners now seem to be likely to finish in the order named: Resta, Porporato, Grant, Rickenbacher, Cooper and Anderson, although it is a toss-up between Rickenbacher and Grant for place.
- 2:20—At the end of the 360th mile Resta's time was 3 hours, 42 minutes and 4 seconds, average 98.5 miles per hour; Porporato's, 3 hours, 43 minutes and 16 seconds, average 96.7 miles per hour; Grant's, 3 hours, 43 minutes, 5.9 seconds, average 96.4 miles per hour—less than 2 minutes separating the first three.

2:29—Resta seems to be slowing up a little, although he is leading the field at 370 miles, his average being 97.9 miles per hour. Porporato is second, with an average of 96.5.

2:35—Cooper and Resta are running neck and neck, changing positions, alternating from one to five car lengths every lap. Three laps and Cooper has to stop for water and gas.

2:41—Resta now leading Cooper by seven laps. The scene has changed—Resta and Porporato now fighting for place.

2:42—At the end of 400 miles Porporato is second, time 4 hours, 8 minutes and 29 seconds, although he is 14 miles back of Resta.

2:46—Resta finishes his 416th mile. Grant has made 400 miles without a stop and is in fourth place. It looks like first, second and third places will be taken by foreign cars. The 400-mile world's record has been broken by Resta, averaging 98.3 miles per hour.

2:51—At the end of 420 miles Resta is leading, time 4:16:58; this is an American record.

2:53—Porporato, Earl Cooper, Burman, Grant, Resta, J. Cooper, Orr, O'Donnell and Van Raalte just passed the stand well bunched. There were five of the cars abreast.

2:56—Excitement is rife. Cooper just gained a half lap on Resta and is running neck and neck with Porporato.

2:58—Resta, Porporato and Grant still lead, 428, 430 and 432 miles respectively.

3:04—At the rate Resta is running he will finish at 3:41, making

the 500 miles in 5 hours and 11 minutes. If Grant can hold out 62 miles more he will establish a world's non-stop record of 500 miles.

3:12—Earl Cooper stops for supplies. Chevrolet has trouble with right rear tire on his 440th mile, while turning into the homestretch, running into the fence. The ambulance rushes to the turn and the crowd surges forward. Chevrolet rights his car and comes to the pits, replacing the tire and getting away in 35 seconds.

3:18—At the end of 460 miles Resta's time was 4:41:12, average 98.2 miles per hour. Porporato second, time 4:44:33, average 96.99 miles per hour.

3:20—Porporato comes in and changes both rear tires. Resta has 14 laps to do yet and is three laps to the good. Grant has 17 laps to go and Porporato 20 laps. Grant has not made a stop so far.

3:30—Burman stops in his 460th mile for oil and gas. Resta has but 14 miles more to go.

3:32:45—Resta finishes his 490th mile.

3:34—Resta stops, he and his mechanic and pitmen working like Trojans. Some mechanical difficulty is apparent as Resta is working with wrench in the vicinity of the transmission. It is to be an eleventh hour defeat? No, he has another supply of gasoline and is away in 27 seconds. He has only 8 miles to go.

3:36—Resta gets the green flag—one more lap to go.

3:37:26.00—Resta wins, time 5 hours, 7 minutes and 26 seconds, average 97.58 miles per hour.

Popocatepetls of Speed

THE Chicago speedway is the fastest track in the world, faster than the famous Brooklands' course. It deserves such fame by virtue of the unprecedented achievement of Dario Resta and the Peugeot Saturday when the winner of the inaugural race run on the wooden oval covered the 500 miles at an average of 97.58 miles an hour. No quarter was given time and distance by the Italian and his merciless rivals who smashed record after record in their astounding drive for \$54,000 in prize money and a plethora of international fame.

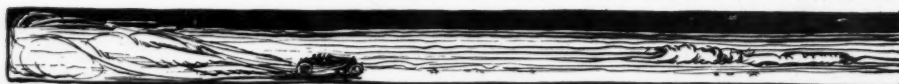
That the Chicago track was built for speed was generally admitted before the starting bomb, which sent Resta on his drive of triumph Saturday, exploded for in practice and the elimination trials, laps were turned at a velocity never equaled before in this country.

Earl Cooper's Stutz, Dario Resta's Peugeot and Barney Oldfield's Christie, each in turn established record laps on the new oval. Cooper first traveled the 2 miles at a speed of 109.2 miles an hour in practice. On the first day of the elimination trials, Resta sent his blue Peugeot over the two-by-fours at a 110.1 mile-a-minute clip. This feat aroused the latent ambition of Barney Oldfield and the cigar-chewing veteran reeled off a lap in the Christie at 111.5 miles an hour and earned the title of monarch of the Chicago speedway.

In the 20 years of motor car racing, only three cars have traveled at a faster rate of speed than that of the Stutz, Peugeot and Christie. The highest velocity ever attained by a gasoline-driven space-destroyer is that of the giant Fiat of 300 horsepower capacity, which driven by Arthur Duray, covered a kilometer, or .621 of a mile, at an average of 142.9 miles an hour at Ostend in December, 1913. Bob Burman's straightaway mile record is almost as fast; Burman sending the Blitzen Benz over the sands of Daytona-Ormond at a speed of 141.73 miles an hour in 1911. The drivers who warmed up their mounts on the Chicago oval failed to equal the 2-mile record of the famous Brooklands track where a Sunbeam, with Chassagne at the wheel, covered the 16 furlongs at a speed of 118.9 miles per hour last year.

The Indianapolis speedway lap record, 2½ miles, was shattered to bits by several of drivers in Chicago's inaugural contest. The fastest lap ever turned on the Hoosier oval is that reeled off by George Boillot in practice for the 1914 international sweepstakes, the dean of the Peugeot team averaging 99.85 miles an hour for one circuit over the bricks.

Oldfield's record lap on the Chicago speedway is 36.6 miles an hour faster than the American 2-mile dirt track record of 77.7 miles an hour, made by Disbrow and



Highest speed at which motor car has ever traveled.....142.9 m.p.h.
Made by Fiat, driven by Arthur Duray, at Ostend, France, 1913



World's straightaway mile record.....141.73 m.p.h.
Made by Benz, driven by Bob Burman, at Daytona-Ormond, 1911



Brooklands' 2-mile record.....118.9 m.p.h.
Made by Sunbeam, driven by Chassagne, in 1914



Chicago speedway 2-mile lap record.....111.5 m.p.h.
Made by Christie, driven by Barney Oldfield, in exhibition, 1915



Indianapolis speedway 2½-mile lap record..... 99.85 m.p.h.
Made by Peugeot, driven by Georges Boillot, in qualifying trial, 1914



Chicago 500-mile record.....97.58 m.p.h.
Made by Peugeot, driven by Dario Resta, in 1915



Brooklands' 500-mile record..... 94.75 m.p.h.
Made by Sunbeam, driven by Chassagne, Resta and Guinness, in 1913



Indianapolis 500-mile record..... 89.84 m.p.h.
Made by Mercedes, driven by Ralph de Palma, in 1915



American road racing record, 301.81 miles..... 87.8 m.p.h.
Made by Mercer, driven by Eddie Pullen, at Corona, 1914



American dirt track 2-mile record..... 77.7 m.p.h.
Made by Simplex, driven by Louis Disbrow, at St. Louis, 1914



Los Angeles motordrome 2-mile record..... 61.5 m.p.h.
Made by Fiat, driven by Caleb Bragg, in 1910

the Simplex at St. Louis, in 1914. The board speedway record of 61.5 miles an hour, established by Caleb Bragg in a Fiat on the Los Angeles motordrome 5 years ago, also has been broken. The Los Angeles motordrome was the only wooden track in the country until it was reduced to ashes by a fire in 1913 and before it was destroyed was regarded as one of the fastest courses in the United States.

Dario Resta, the winner of Saturday's race, also eclipsed the American road racing record of 87.8 miles an hour, made by Eddie Pullen and the Mercer in the 301.81-mile Corona classic of last November, and the 500-mile marks at Indianapolis and Brooklands. The best time for the 5 centuries at Indianapolis in 89.84 miles an hour, established by Ralph de Palma's Mercedes in winning the 1915 gasoline derby of the Hoosiers, and the Brooklands' 500-mile record is 94.75 miles an hour, held by the Sunbeam.

BURMAN CREDITED WITH RECORDS

New York, June 24—At a meeting of the contest board of the American Automobile Association, Bob Burman, the Peugeot driver, was credited with the following official records, all made on the 1-mile dirt track at Bakersfield, Cal., January 3, 1915:

Ten miles, 8 minutes 16.4 seconds; 15 miles, 12 minutes 23.2 seconds; 20 miles, 16 minutes 25.6 seconds; 25 miles, 20 minutes 28.8 seconds; and 50 miles, 40 minutes 57.8 seconds.

The following requests for 1916 dates were received: Indianapolis speedway, May 30, and the Twin City speedway, July 4 and Labor Day. The board decided to wait until September 30 or October 1 before assigning dates for next season. A schedule will be drafted at that time.

Gradual Conquest of Time and Distance by Gasoline

1895	Paris-Bordeaux-Paris race, won by Panhard, Levassor; 740.2 miles...	14.9	m.p.h.
1896	Paris-Marseilles race, won by Panhard, Mayade; 1068 miles.....	15.9	m.p.h.
1897	Paris-Dieppe race, won by Panhard, Gilles-Hourgieres, 105.5 miles.....	23	m.p.h.
1898	Paris-Amsterdam-Paris race, won by Panhard, Charron; 932.74 miles.....	27.3	m.p.h.
1899	Paris-Bordeaux race, won by Panhard, Charron; 360 miles.....	30.2	m.p.h.
1900	Paris-Toulouse-Paris race, won by Mors, Levegh; 837.1 miles.....	40.2	m.p.h.
1901	Paris-Bordeaux race, won by Mors, Fournier; 350.86 miles.....	53.3	m.p.h.
1902	Circuit des Ardennes race, won by Panhard, Jarrot; 317.95 miles.....	54.3	m.p.h.
1903	Paris-Madrid race, won by Mors, Gabriel; 342.81 miles.....	65.3	m.p.h.
1904	Florio cup race, won by Fiat, Lancia; 231.63 miles.....	72.0	m.p.h.
1905	Targa Florio cup race, won by Itala, Ragallo; 311.12 miles.....	65.8	m.p.h.
1906	Circuit des Ardennes race, won by de Dietrich, Duray; 373.6 miles.....	66.0	m.p.h.
1907	French grand prix, won by Fiat, Nazzaro; 477.17 miles.....	70.6	m.p.h.
1908	Florio cup race, won by Fiat, Nazzaro; 326.88 miles.....	74.15	m.p.h.
1909	Riverhead, L. I., road race, won by Buick, Chevrolet; 113.75 miles.....	70.0	m.p.h.
1910	Santa Monica Road race, won by Lozier, Tetzlaff; 200 miles.....	71.3	m.p.h.
1911	Santa Monica road race, won by National, Herrick; 202 miles.....	74.93	m.p.h.
1912	Indianapolis 500-mile race, won by Marmon, Harroun.....	74.59	m.p.h.
1913	Santa Monica road race, won by Fiat, Tetzlaff; 303.01 miles.....	78.5	m.p.h.
1914	Indianapolis 500-mile race, won by National, Dawson.....	78.72	m.p.h.
1915	LeMans grand prix, won by Delage, Babiott; 336 miles.....	76.8	m.p.h.
1916	Indianapolis 500-mile race, won by Peugeot, Goux.....	75.92	m.p.h.
1917	Corona road race, won by Mercer, Pullen; 301.81 miles.....	87.8	m.p.h.
1918	Indianapolis 500-mile race, won by Delage, Thomas.....	82.47	m.p.h.
1919	Venice, Cal., road race, won by Maxwell, Oldfield; 300 miles.....	86.5	m.p.h.
1920	Chicago 500-mile race, won by Peugeot, Resta.....	97.58	m.p.h.

SINCE the fall of Adam, man has been waging a ceaseless battle against time and distance. In the merciless struggle for his foes' annihilation, he has found the motor car his most powerful ally. Gasoline has robbed the milestones, which formerly marked weary leagues of travel for men and beast, of their terrors and has carried man through space at a speed none but a superman should dare attempt.

The conquest of time and space by gasoline has been gradual, however. Although motor car racing had its inception in 1895, it was not until 1913 that man was able to crowd 100 miles within a fleeting hour and achieve an ambition that was looked upon as a chimerian dream by the pioneer drivers of 18 years before.

The first road race ever held in this country, the Chicago Times-Herald run of 70 miles to Evanston, Ill., and return, was won at the ridiculously slow speed of 7.5 miles an hour in 1895.

Compare this snail-like pace to the 301.81-mile road racing record of 87.8 miles an hour, held by Eddie Pullen's Mercer by virtue of the victory at Corona last Thanksgiving day, and the 500-mile speedway record of 97.58 miles per hour, established by Resta's Peugeot in winning the Chicago race Saturday, and you begin to realize what wonderful advances have been made in the development of the gasoline-driven vehicle in the past two decades.

In the first 10 years of motor car racing, the speed of the gasoline-driven vehicle increased from 14.9 miles per hour to 72 miles per hour, Lancia, driving a Fiat, reaching the high velocity pinnacle of the first decade in the Florio cup race of 1904.

The fastest average speed dropped in 1905 to 65.8 miles per hour but then started to rise gradually until in 1908 Felix Nazzaro established a new high velocity mark of 74.15 miles an hour in the Florio cup race of that year.

Although the fastest average speed for the year dropped after Nazzaro's triumph, American drivers shot to the front and for 4 years held the road racing record. Chevrolet, in a Buick, won at Riverhead in 1909 at a speed of 70 miles an hour, Tetzlaff brought the average up to 71.3 miles an hour at Santa Monica in 1910, Herrick raised it to the never-before-attained mark of 74.93 miles an hour in 1911 at Santa Monica, and the following year Tetzlaff established a new world's road racing record of 78.5 miles an hour.

Tetzlaff's 1912 mark was not better until last year when Pullen's Mercer averaged 87.8 miles an hour in the Corona contest and put the road racing speed beyond the best time made on the Indianapolis speedway until this season.

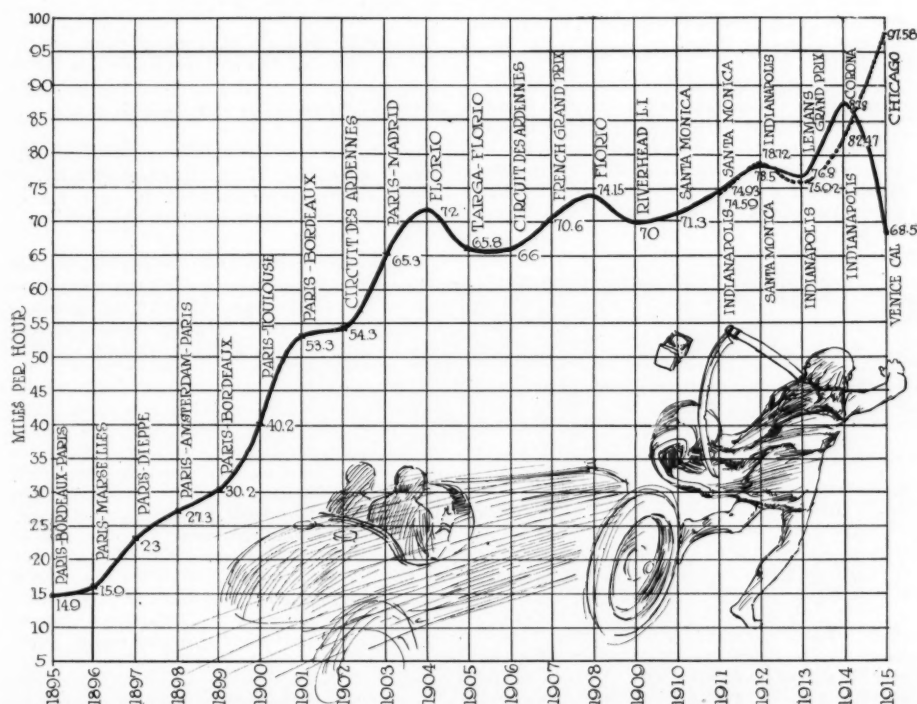


CHART SHOWING THE PINNACLES OF SPEED REACHED IN 20 YEARS OF MOTOR CAR RACING IN AMERICA AND EUROPE



Taps for the Speed Massacre

RESTA'S PEUGEOT TRAVELED AT SUCH SPEED THAT THE CAMERA WAS UNABLE TO REGISTER ITS FLIGHT

DARIO RESTA, the victor, has won three races out of four starts in this country and placed second in the other. He captured the grand prize and Vanderbilt cup events at San Francisco in the spring and the inaugural race on the Chicago speedway Saturday and was runner-up to Ralph de Palma at Indianapolis. His winnings in this country total \$45,000, divided as follows: San Francisco, \$12,000; Chicago, \$23,000, and Indianapolis, \$10,000.

Only one of the twenty-one drivers that competed in Saturday's race accepted relief, Johnny Aitken replacing Gil Anderson in the Stutz. Scott pumped oil for Aitken, Dutton, Anderson's mechanic, being relieved at the same time that Gil was.

Six cars, four of which completed the 500 miles, did not stop for new tires. Grant's Sunbeam, Alley's Duesenberg, Joe Cooper's Sebring and Babcock's Peugeot rode on the same air from starting bomb to checkered flag. The other drivers that had no tire trouble were Billy Carlson and Ralph Mulford, both of whom were only a few laps from their goal when the race was called.

At 9 o'clock the cars and drivers were introduced to the spectators. Each contestant drove a dress parade lap, carrying the flag of the nation from which the car hailed and with the band playing the national air.

The song pluggers were out in force and entertained the crowd before the race and while the speed massacre was on. Just after the drivers cranked their cars for the start, Flo Jacobson, the world's greatest outdoor vocalist, drowned out the roar of the challenging motors with the syncopated strains of "Bird of Paradise." You've said it; some pipes is right!

The course was patrolled by 450 officers and men of the Illinois National Guard, under command of Colonel Charles B. Greene of the Third Infantry. Seven companies, the

members of which all are veterans in this kind of work as they have seen service at Elgin ever since the inception of the road races there, were on duty.

Never has a greater array of pulchritude been assembled to officiate at a race than the corps of Chicago Automobile Club members who had charge of the running of the inaugural contest on the Chicago track. They were all dolled up for the auspicious occasion, wearing tan shoes and puttees, white trousers, shirts and hats and blue coats and neckties. As Eddie Foy once remarked, "Twas a pretty thing."

William Hale Thompson, Chicago's sportsman-mayor, who has sailed racing yachts and hit the line hard on the gridiron, was on the job early. He was introduced to the drivers and showed his partiality by rubbing Earl Cooper's hand with the gold billiken which he wears on one end of his watch chain.

Pit stops cost Earl Cooper the race. Could he have duplicated Harry Grant's performance, he would have lead Resta to the tape by 1 minute 48 seconds. The Californian lost 10 minutes 21 seconds at the pits and finished 8 minutes 33 seconds behind the triumphant driver of the Peugeot.

Tom Alley was the first driver to stop at the pits, bringing his Duesenberg in to repair a slipping clutch after completing the first lap. The Ogren, tooled by Billy Chandler, was the first car to fall by the wayside, a broken bevel pinion housing causing its elimination after 24 miles had been covered.

There was a regular stage snowstorm of paper napkins and lunch wrappings soon after the lunch hour. The paper fluttered over the home stretch, and, sucked up by the flying cars, caught in the radiators and blew in the drivers' faces.

For a speedway that was built in 50 days,

the Chicago plant is a wonder. The grand stand and bleachers each are one-half mile in length and are the largest structures of their kind in the country. Work was not started on one section of the grandstand until 2 o'clock the day before the race.

There was a thrill every minute of the 5 and a fraction hours. At times there were as many as eight cars bunched on the turns and often two or three space-gourmands came down the home stretch fighting wheel to wheel and hood to hood.

Governor Edward F. Dunne, chief executive of Illinois, did not reach the speedway until after the starting bomb exploded. He was accompanied by his daughters.

In addition to the \$23,000 in prize money, Resta won the \$1,000 Rayfield trophy, a silver punch bowl awarded by the maker of the Rayfield carburetor to the winner.

Before the start of the race several drivers had not determined on what tactics to pursue. Bob Burban, for example, was undecided Friday night whether to go out and beat it or lie back for the leaders to pass him retrogressively.

While the race was being run it was announced that Earl Cooper was the leader at the end of the first 100 miles but when the timers and scorers checked over their checks, it was found that Porporato had made the fastest time for the first century. In the rechecking process the positions of three cars were changed from the positions originally given them, Alley's Duesenberg being dropped from seventh to ninth and Chevrolet's Delage and Burman's Peugeot being moved up to seventh and eighth positions respectively.

According to David F. Reid, president of the Chicago speedway, the receipts totalled \$500,000 and the expenses were \$120,000, making a profit on the first race of \$280,000.



Motors Withstand the Acid Test

Nine of First Ten Drivers to Finish Chicago Contest Do Not Raise Hoods Once in the 500 Miles of Record Smashing

EVERYONE, whether layman or expert, was agreed that the extremely high speed capability of the Chicago speedway would provoke motor trouble, and prophets were not wanting to predict that the speed made at Indianapolis would not be beaten; simply because the cars would not stand up under treatment any more severe. The events of the day prove that the prophets were wrong, as they often have been before in racing predictions.

Of the cars which finished well up in the list, nine of the first ten did nothing to their motors throughout the race. Bob Burman, the eighth man, changed a couple of spark plugs on two occasions but the others in the money never touched their motors at all. Thus out of ten cars all running 500 miles at a speed in excess of 90 miles an hour, a total distance of 5,000 car miles, all that was done to the engines was the changing of four spark plugs.

Compared with Indianapolis

It is not very long since the Indianapolis 500 showed a very different state of affairs, so there can be no question that the lessons learned in the Hoosier classic have been taken to heart, and that the time interval has been sufficient to enable the owners of the competing vehicles to make good use of their experiences.

At Indianapolis, two things stood out prominently as troubles. Spark plugs and materials. Both these in turn reflect to lubrication, for the spark plugs which failed to spark mostly did so because of too much oil, while

SUMMARY OF RELIABILITY

Forty ultra light pistons stood up.
One hundred and forty valves and valve springs stood up.
Ten magnetos supplied at least 18,000,000 sparks.
Sixty spark plugs took this discharge and stood up—probably those which Burman changed were missing because of oil.
Eleven carbureters gave a steady supply of proper gas.
Oil in proper quantities reached the 1,000 moving parts of the ten motors.
And this is the main point of the whole demonstration:
Only two cars of modern design suffered broken parts, despite such a thrashing as a bunch of racing machines never before has received.

the materials which, in the forms of pistons or connecting rods, could not stand the stress, mostly failed because absence of oil at the right place produced too much friction, and so too much heat.

Improvement in Design

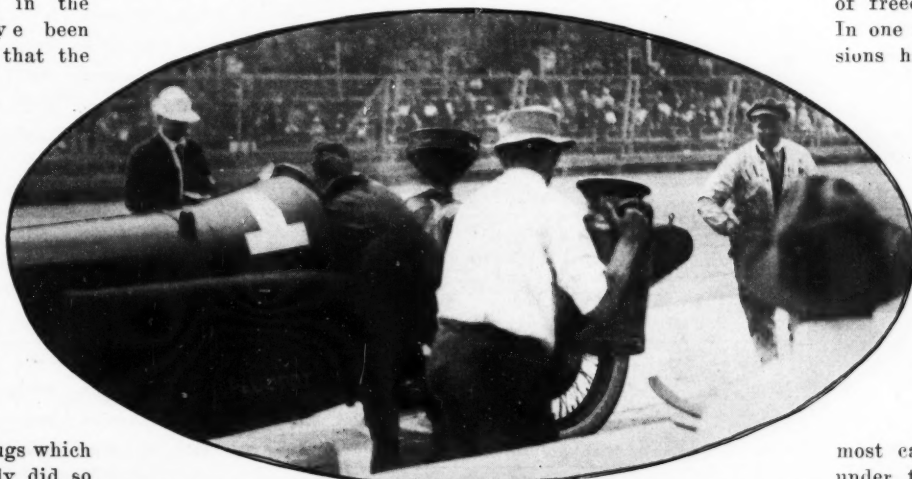
This has not been always so, for some of the mechanical breakdowns at Indianapolis were caused by too weak a design, such as the use of too fine a fillet between the head and the wall of an aluminum alloy piston. Such things as this have been changed, the oil pressures have been adjusted, the piston clearances have been modified so as to give the best compromise of freedom and oil tightness.

In one or two cases, compressions have been altered and valve spring strengths have been increased a little, but nothing radical has been done.

One might sum up the whole situation by saying that Indianapolis showed us a bunch of fine cars, either altogether new or partly new; cars prepared with the ut-

most care, but not tried out under the only really severe test—that of a long race.

VIEW OF THE PIT'S DURING THE RECORD SLAUGHTER AT CHICAGO



RESTA STOPS FOR GASOLINE AND OIL 4 MILES FROM HIS GOAL



BOB BURMAN REASSEMBLING MOTOR JUST BEFORE START

At Chicago, we now have seen the same cars freed from their minor faults, with the bugs removed. They are to the cars of 4 weeks ago as the stock product of a good manufacturer is to his last experimental model and this world's record-breaking race in Chicago is the finest testimony to the importance of little things that the world of motoring has ever had.

Motor's Task Easier

One thing, and one thing only, made the motor's task a little easier, and this was a general use of slightly higher gear ratios,

but this was offset or even more than nullified by the greater speed and the much higher air temperature.

That the smoothness of the board track had the effect of lessening the shocks to which the cars were subjected is undeniable, but shocks play but a little part in motor reliability, although they play a big part in the lasting power of springs and axles. Perhaps the roughness of the Indianapolis brick might be blamed for the loosening of the magneto platform on Van Raalte's Sunbeam, but that is about the

only motor trouble in the former race which fairly could be traced to shock.

It is difficult at first to realize what the speed of this Chicago race really means. The tabulation of reliability given above is but a pale outline of a few of the things which together make the most wonderful demonstration of motor efficiency the world ever has seen.

Regarding the Prize Winners

Perhaps the casual observer is liable to give weight to the fact that the first and second cars were both of foreign origin, but anyone knowing to how great an extent small things outside the chassis construction play their part in race winning will pay but little regard to who won, rather will he look to the whole ten who made more than the 90 miles an hour.

Take the Stutz case, for example. Here we had evidence of a speed capability, in Wilcox's car, which at least was equal and perhaps in excess of that of either the Peugeot or the Sunbeam, and Anderson's Stutz, which finished within 12 minutes of the winner, had many tire stops. Out of this time, Anderson spent nearly 7 minutes more than Resta on tires alone, so his car was only 1 minute an hour slower than Resta's.

Why the Stutz car was so unfortunate with tires remains a mystery up to the present, for it was using the same sort as its luckier brethren, and using them under the same conditions. Possibly the cars were held a little lower down on the banking than the Peugeot or the Sunbeam, but even John Palmer, the originator of the cord tire, is not prepared with any explanation as to the remarkable difference in tire reliability as between one car

Drivers, Mechanics, Motor Sizes and Equipment of Cars Competing in Chicago Race

No.	CAR	DRIVER	MECHANICIAN	Cyl.	Bore	Stroke	Disp.	Spark Plugs	Carb.	Mag.	Make	Tires Size	Wheels	Wheel Base	Weight
1	Peugeot.....	Resta.....	McCarthy.....	4	3.62	6.67	276	K. L. G....	Zenith.....	Bosch	Silvertown..	35x5	R. W.	109	2400
2	Stutz.....	Wilcox.....	Scott.....	4	3.812	6.50	296.8	Bosch.....	Stromberg..	Bosch..	Silvertown..	33x5	Houk	102	2404
3	Stutz.....	Anderson.....	Rooney.....	4	3.812	6.50	296.8	Bosch.....	Stromberg..	Bosch..	Silvertown..	33x5	Houk	102	2340
4	Stutz.....	Cooper.....	Dutton.....	4	3.812	6.50	296.8	Bosch.....	Stromberg..	Bosch..	Silvertown..	33x5	Houk	102	2385
5	Maxwell.....	Carlson.....	Franzen.....	4	3.75	6.75	298.2	Bosch.....	Master.....	Bosch..	Silvertown..	35x5	Houk	105	2202
7	Maxwell.....	Rickenbacher..	Schroder.....	4	3.75	6.75	298.2	Bosch.....	Zenith.....	Bosch..	Silvertown..	35x5	Houk	105	2267
9	Peugeot.....	Burman.....	Gable.....	4	3.65	7.10	296.0	Bosch.....	Master.....	Bosch..	Silvertown..	34x4½	R. W.	105	2350
10	Sunbeam.....	Van Roalte.....	Copple.....	4	3.70	6.30	274.0	K. L. G....	Zenith.....	Bosch..	Silvertown..	35x4½	R. W.	112	2244
11	Sunbeam.....	Porporato.....	Romeo.....	4	3.70	6.30	274.0	K. L. G....	Zenith.....	Bosch..	Silvertown..	35x4½	R. W.	112	2300
12	Delage.....	Chevrolet.....	Phillips.....	4	3.662	7.09	298.68	Bosch.....	Claudel....	2-Bosch	Silvertown..	33x4½	R. W.	110	2350
15	Duesenberg...	O'Donnell.....	P. Henderson...	4	3.98	6.00	299	Bosch.....	Schebler....	Bosch..	Silvertown..	33x5	R. W.	106	2170
17	Sunbeam.....	Grant.....	Moore.....	6	3.26	5.89	274.9	K. L. G....	2-Master...	Bosch..	Silvertown..	35x5	R. W.	110	2480
19	Duesenberg...	Alley.....	J. Henderson...	4	3.98	6.00	299.0	Rajah.....	2-Master...	Bosch..	Silvertown..	33x4½	R. W.	106	2120
20	Mercer.....	Henning.....	Davis.....	4	4.75	6.75	298.2	Bosch.....	Rayfield....	Bosch..	Silvertown..	33x4½	R. W.	110	2400
21	Duesenberg...	Haupt.....	Johnson.....	4	3.98	6.00	299.0	Bosch.....	Schebler....	Bosch..	Silvertown..	33x5	R. W.	106	2160
22	Peugeot.....	Babeock.....	Pallott.....	4	3.07	6.141	186.0	K. L. G....	Claudel....	Bosch..	Silvertown..	34x4½	R. W.	104	2100
23	Sebring.....	J. Cooper.....	Peio.....	4	3.98	6.00	299.0	Bosch & Rajah	h Master....	Bosch..	Silvertown..	33x5	R. W.	102	2499
24	Ogren.....	Chandler.....	Liphardt.....	4	3.98	6.00	299.0	Rajah.....	Rayfield....	Bosch..	Silvertown..	33x4½	Houk	106	2499
27	Maxwell.....	Orr.....	Stafford.....	4	3.75	6.75	298.2	Rajah.....	Master.....	Bosch..	Silvertown..	35x5	Houk	105	2200
30	Mulford.....	Mulford.....	Stevens.....	4	3.687	7.00	299.0	Rajah.....	Zenith.....	2-Bosch	Silvertown..	33x4½	R. W.	102	2456
31	Sunbeam.....	Limberg.....	Longchamp.....	6	3.26	5.89	274.9	K. L. G....	2-Master...	Bosch..	Silvertown..	35x5	R. W.	116	2450

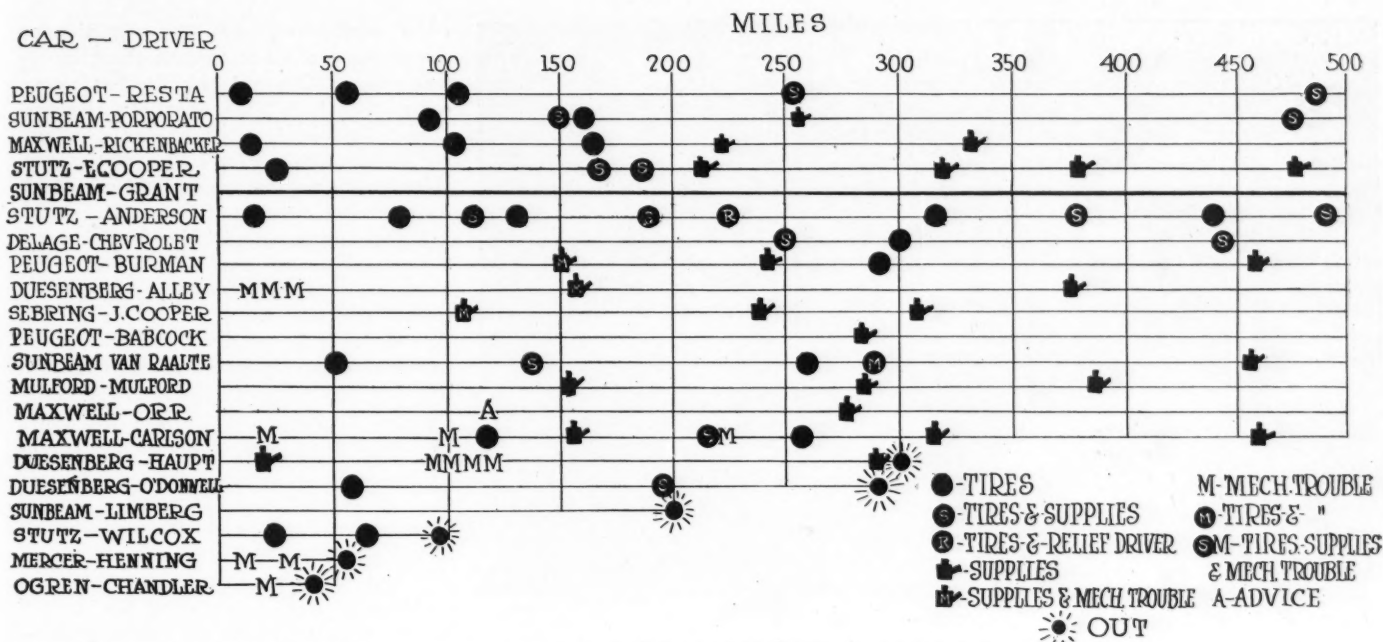


CHART SHOWING ZONES OF TROUBLE AND REASONS FOR STOPS AT PITS. FOR THE NUMBER OF TIRES CHANGED EACH STOP, CONSULT TIRE CURVE ON PAGE 26

and another. At Brooklands high driving seems to save tires.

Still, to keep to the motors, at Indianapolis, the general idea was that in putting up a speed which represented the limit of the track, the limit of the motor had been reached as well. Chicago proves this is wrong, so the present idea is rather that the faster and easier course brings us to tires and human endurance once more. Had the Chicago race been for 300, instead of 500 miles, it undoubtedly would have been won at well over 100 miles an hour.

In a mechanical review of the happenings of a race it generally is possible to take instances of trouble or failure and therefrom to extract lessons of engineering interest. Concerning this race, so little happened and there was so little trouble that the arising question is "how can we get more speed," instead of "how can we maintain the speed set as a standard?"

Chicago sets the mark of the multi-valve motor, it shows the sixteen-valve, four-cylinder developed to an equal pitch by America, France and England. Carburetion has been got in hand, ignition difficulties are overcome, aluminum alloy pistons have established their place.

Grant Establishes Stop Record

But in this review, let us not forget Grant's old Sunbeam, for this is no modern creation, but an old warrior amongst the veterans of the race track, with an L-head motor, two valves per cylinder and none of the aids to power developed within the last 2 years. Grant made his show largely by knowing how fast he could drive without trouble, by knowing that he had gas and oil enough for the whole journey and by having good reason to trust in his tires.

Perhaps the smoother torque of the six-cylinders had something to do with his tire reliability, but there is no shadow of doubt

that his steady speed without 100-mile-an-hour bursts had a great deal more to do with it. Probably his speed is the limit of which the car is capable, but it is considerably higher than the manufacturer ever expected of it in a race as long as 500 miles.

Causes of Retirements

Wilcox's Stutz, the only car of that make which retired, suffered a broken piston.

The Ogren suffered a mishap which

might be due to faulty material or to insufficiently strong design—an extraordinary sort of failure altogether. It was the fracture of the casing which holds the bevel pinion and its bearings, this allowing the pinion to fall out of mesh with the ring gear. In such a case, nothing possibly could be attempted.

The old Mercer reported that no spark could be kept going and investigation made by the writer with the aid of the Bosch representatives disclosed the fact

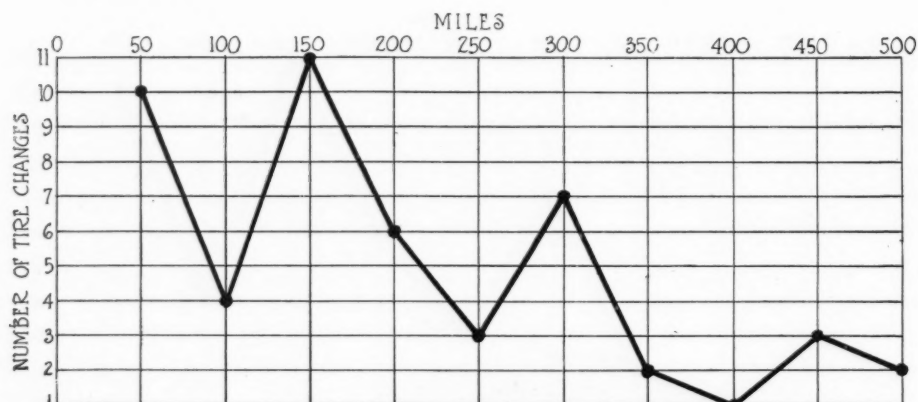
that the pistons, whether from too large a clearance or some other cause, were allowing so



PORPORATO COMES IN FOR A TIRE CHANGE



RESTA ON ONE OF HIS PIT STOPS GULPS DOWN A GLASS OF WATER



CURVE SHOWING NUMBER OF TIRES CHANGED IN EACH 50-MILE PERIOD OF RACE

much oil to pass that the plugs became literally filled up with it. No plug on earth could have sparked under such a smothering cloud of lubricant.

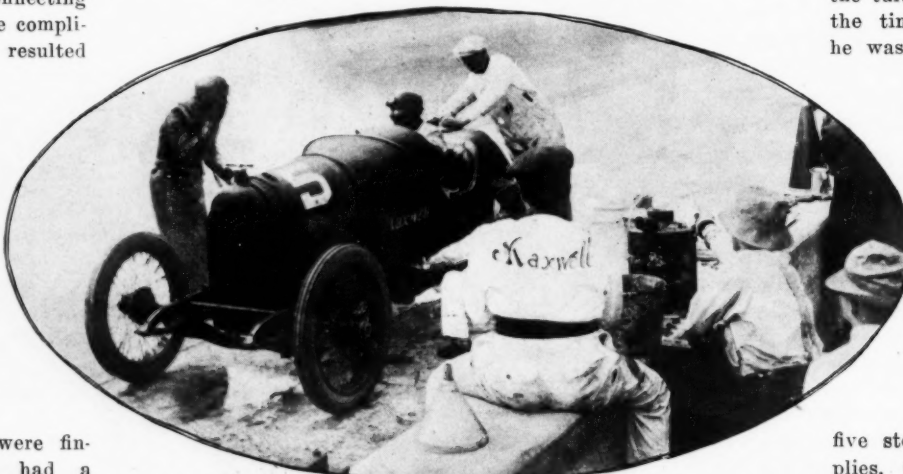
Limberg's Sunbeam in Trouble

Lastly, Limberg's old Sunbeam, which is a sister car to Harry Grant's, burned a bearing or broke a connecting rod bolt, causing some complications inside which resulted in a punctured crankcase. Investigation by pulling down the motor was not made on the spot, but it might be supposed reasonably that an instant's pause in the oil supply bearing was the primary cause.

Of the cars which were left running after the first ten were finished, Van Raalte had a broken connecting rod and had been running for several

hours on three cylinders. The piston seized, the rod broke, hit the piston and bent it so that it jammed in the cylinder mouth, and the bits of rod and piston then dropped into the crankcase.

The two Maxwells which failed to get amongst the prize winners appeared simply



CARLSON ABOUT TO GET UNDER WAY AFTER A STOP OF 36 MINUTES TO CHANGE A MAGNETO

to be insufficiently fast. Some ignition adjustments were made even to changing the magneto on Carlson's mount, but apparently they had little effect on the running. Neither Mulford on his own car, nor Babcock on the little Peugeot did anything in the way of repairs and ran steadily, if rather slowly.

Before the opening of New York's track 3 months hence, some of the cars will be improved and some will have a little of the life worn out of them, but if the race is to be a shorter one at Sheepshead Bay, there seems no doubt that we will have motors and chassis easily capable of putting half a dozen cars above the 100-mile-an-hour mark, supposing, of course, that the track is as good and as easy as the Chicago speedway, which is without doubt the fastest track ever built.

How They Took the Turns

It was anticipated that there would be considerable variation among the drivers in the way they took the turns, preliminary practice showing that there was a good deal of experimenting going on to find the point on the curves where the best results were obtained as to speed, skidding, ease of driving, and particularly tire wear.

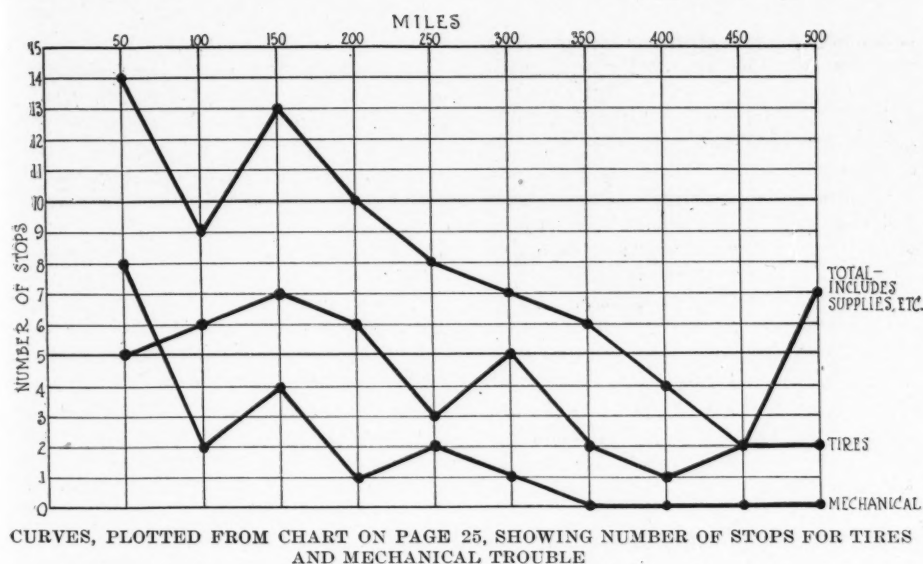
Before practice ended, however, it became apparent that most of the drivers had elected to take the course as near the inside as possible on the curves, hugging the black line which had been painted 18 inches from the bottom of the bank.

In the actual race today this was proven to be the case, as very few drivers got very far away from the inner edge except when forced to in passing another car. In fact, a very decided path was established before the race was long in progress, the oily track being not far from the pole on any of the curves.

This path was very little wider than twice the tread of the cars. Anderson hugged the inner edge pretty closely, but this proved little in the way of tire wear, as most of the others did, too.

Porporato was the driver most consistently to deviate from this rule, as he drove the turns pretty high most of the time, seemingly because he was passing cars and did most of his passing on the curves. When he had a clear track ahead of him, he kept down on the beaten path.

To take up the pit work in detail, a study of the technical committee's report on the stoppages at the repair pit shows that Resta made, in all, five stops for tires and supplies. On three of these nothing was done except the replacement of a right rear tire,



the first one occurring 17 minutes after the start, the second 42, and the third 1 hour and 50 minutes after the start.

He had traveled 32, 74 and 180 miles, respectively, before each stop. The fourth stop occurred just after he had passed the half-way mark, 254 miles, to be exact, when he took on gasoline and oil. The last one, with only two laps to go, he changed a right rear and again replenished his gasoline and oil supplies. His shortest stop and shortest tire change was 25 seconds; his longest stop was 56 seconds, and his total time lost was 3 minutes and 11 seconds.

Porporato in a Sunbeam likewise made five stops, none of which were for mechanical work. The first stop came after he had run 92 miles when he changed both outside tires, getting away in 50 seconds. He ran 68 miles further, and changed a right front tire and filled up his gasoline tank. This held him for 44 seconds.

After another two laps he changed both front tires in rather slow time, taking 1 minute and 22 seconds for the operation. He then ran 100 miles without a stop, when he came in for 2 minutes and 3 seconds, this time to consult with this crew at the pit, at the same time taking on gasoline. His last stop was 50 miles short of the finish, when he changed two tires and took on gasoline, requiring 1 minute and 15 seconds for the work. Porporato lost 6 minutes and 14 seconds during his stops.

Stops Each 100 Miles

Like the two ahead of him, Rickenbacher in a Maxwell slid into the pits on an average of once each 100 miles for tires and supplies. The first three stops were occasioned by tire changes alone. The first three stops were occasioned by tire changes alone. The first after 26 miles, the second after 104, and the third after 176 miles.

During these three stops he was halted 32, 29 and 25 seconds respectively. The other two stops, which occurred after he had run 226 miles and 341 miles each, were for water, gasoline and oil, taking 58 sec-

onds in the first instance and 50 seconds in the second instance. Rickenbacher lost in all 3 minutes and 14 seconds at the pits.

Cooper in a Stutz made the most stops of any one to finish, except his team mate Anderson, coming in seven times, and taking on gasoline each time. The last four times he stopped, Cooper also refilled his radiator. The first time, in addition to refilling the fuel tank, he changed a right rear tire. His shortest stop was 25 seconds, and the longest one was 3 minutes and 46 seconds. He lost a total of 10 minutes and 21 seconds at the pits.

Anderson Stops Many Times

Anderson holds the record for the number of pit stops among the cars to finish, coming into the repair pits eleven different times during the 500 miles. The first time was after he had run 130 miles, when he changed a tire in 36 seconds; the next he switched mechanics and also took on a

new tire. The shortest stop was the eleventh and was 31 seconds, in which a right rear tire was changed and gasoline was taken on. The longest stop was 1 minute and 32 seconds, the time when Johnny Aitken relieved Anderson and the tire was changed. Altogether the No. 3 Stutz lost 9 minutes and 2 seconds.

Harry Grant never made a stop during the entire race. His fuel and oil held out, his tires looked very good at the finish.

Chevrolet Furnishes Thrill

Chevrolet in the Delage made only three stops, during each of which he changed a tire. He also took on gas during the first one and gas and water during the third one. He made no stop at all until he had run half the distance, that is, 250 miles.

Chevrolet's final stop, which occurred when he only had 60 miles to go, was caused by a blowout, one of the few hair-raising thrills of the race. Just as he was crossing the tape on his four hundred and fortieth mile Chevrolet blew his right rear tire and skidded into the fence. He straightened up nicely however.

Burman likewise stopped only three times. The first one occurred after he had run 246 miles, or nearly half the distance, and the second 23 miles further. Both times he changed two plugs, furnishing the only mechanical work to be done on any of the cars that finished in the money. His stops, however, were somewhat costly in time, losing him 9 minutes and 55 seconds.

Alley in the Duesenberg, No. 19, was bothered with clutch trouble and made seven stops altogether, the first three of which were caused by the clutch. He then developed a radiator leak which was stopped up partially by putting some dope in it, but he had to stop twice afterwards for water, at the same time he took on gasoline and oil. Alley did not change a



LOOKING AT THE CHICAGO SPEEDWAY PITS FROM THE OFFICIAL STAND

tire during the race and the tires looked fair at the finish.

Joe Cooper in a Sebring stopped at the pits only four times, the first one halting him for 1 minute while he wired up the exhaust manifold, which was loose, and took on gasoline and oil. The Sebring ran through on its original tires. Babcock made only one stop and that for gasoline.

Duesenberg's Scoring Machine

Fred Duesenberg had installed in his pit an elaborate and interesting method for keeping exact score on all of the cars in the race, with the idea of knowing exactly the place of his three entries and their relation to the cars ahead and behind them.

This consisted of, first, a series of lap counters, one for each car, and operated individually by a large aluminum key. Then there was a score sheet having rulings for each car each five laps. This was operated by a motor, which kept it moving. It was ruled in squares, so that a mark could be made for each car as it passed the pit. This proved a check on the lap counter and also gave a graphic record of the lap counter. Four men were required to work the two systems, three men on the lap counters, each one having eight

cars and paying no attention to any others, and one man making the graphic record.

Every car which started in the race used a Bosch magneto and of the ten lucky drivers five used Bosch spark plugs, three employed K. L. G., a foreign type of plug name after the maker, K. Lee Guinness, and two used Rajahs. Zenith carbureters were fitted to the cars which finished first, second and third, Masters were used on four of the first ten cars, Stromberg on two and Claudel on one.

Wire wheels carried every car in the race on its journey, Houk wheel being used on the third, fourth and sixth cars to finish and Rudge-Whitworths, now made in this country by the Standard Roller Bearing Co., were fitted to the others finishing in the money.

Few of the cars which started were minus a radiator meter and Resta and six other ones to take prize money used a Boyce Motometer. Four of the foreign cars used tachometers or revolution counters. Most of the drivers know the motor speed which will give a certain car speed and so drive according to the tachometer, as the motor speed is the determining factor.

tire, but he made no stop for any reason whatsoever during the race. His feat, however, was duplicated by three other cars, so far as tire consumption was concerned, Alley in the Duesenberg, Babcock in the Peugeot, and Cooper in the Sebring, all running the entire 500 miles without a tire change.

Anderson in the Stutz changed the most tires of any one in the race, putting on eleven new casings. Van Raalte, in the Sunbeam, was a close second, with nine casings. Porporato, in a Sunbeam, used seven, Resta used four, Rickenbacher and Cooper, in the Stutz, as well as Chevrolet in the Delage, each took on three. Burman came through with only one change. Mulford, who was flagged within a few miles of the finish, made no changes.

LOS ANGELES TO HAVE SPEEDWAY

Chicago, June 24—The speedway virus has been injected into the good right arm of Los Angeles and by the time that the first snow piles up on the ovals of the middle west and New York, the California city will be ready to dedicate a 2-mile board track to the gods of speed and welcome the shivering drivers to a realm of sunshine and roses.

For Los Angeles is to have the first motor speedway to be built on the Pacific coast. A. M. Young, prominent in the promotion of the Santa Monica and Corona road races, is the chief backer of the project and has raised sufficient capital to build the track. Options have been secured on three sites, all within the Huntington Park district, and within 15 minutes' trolley ride from the center of the city, and one will be closed immediately.

The final selection of a site will prove a difficult matter, for each is considered ideal. The grounds under consideration are all as level as the proverbial billiard table, connected with the business district of Los Angeles by boulevards, and easily and quickly reached by street car. The owners of the realty most favored have agreed to take a block of speedway stock as part payment for their land and to accept a mortgage for the balance of the purchase price.

The promoters of the Los Angeles speedway sent L. W. Wickes, the engineer who will be in charge of the construction of the proposed track, to Chicago last week to study the local wooden oval.

Los Angeles will ask for the Thanksgiving day date and aims to dedicate its board oval on the day when the sport followers of the middle west and east are dividing their attention between turkey and football. It is the intention of the coast promoters to hold a second race there early in the spring.

No Tire Change Made on Six Cars

Silvertowns Better Indianapolis Feat at Chicago

CHICAGO, June 26—Today's inaugural of the new Chicago speedway served to prove among the many questions which were subject of speculation, the fact that the board track, as it is built at the Windy City, is considerably easier on tires than is the Indianapolis speedway. This may be shown by the fact that on the twelve cars which finished today's race, only forty-one new tires were required, as against forty-four new tires taken on by the eleven cars which finished the Hoosier classic. This means that in the 6,000 miles covered by the finishers today it took one new tire for each 146 miles, whereas at Indianapolis the 5,500 miles took a new tire for each 100 miles; that is, the tires ran 46 per cent farther on the board oval than they did on the brick.

Forty-nine new tires in all were used in the 8,370 miles of running of the twenty-one cars in today's race. This is an average for the total number of starters of 170 miles per tire. The finishers in today's race used just over three new tires per car, whereas at Indianapolis it took four tires per car for the finishers.

Today's event was a complete victory for Silvertown cords. The record established for tire

mileage in racing by the Goodrich people with their cord tires at Indianapolis was shattered today when the same make of tires made a showing even better than was expected on the basis of the Indianapolis performance.

The palm must be handed to Grant and his six-cylinder Sunbeam on tire performance, for Grant not only did not change a



BOB BURMAN AND HIS HELPERS WORK LIKE FIENDS TO REPLACE BROKEN PISTON 30 MINUTES BEFORE START

Service Discussed and Defined at Managers' Convention

Fifty Motor Car and Truck Makers Represented at Detroit Meeting Held Under Auspices of National Body

DETROIT, Mich., June 29—Special telegram—Today's sessions of the service managers' convention held at the Statler hotel here under the direction of the National Automobile Chamber of Commerce, brought forth ninety service men and representatives of fifty motor car and truck makers. There was much discussion of just what the owner should expect in the way of service, and many definitions of the word were offered. Various phases of the relation between the service end of factory and the dealers were dissected and frankly discussed.

Alfred Reeves, general manager of the chamber, spoke for the same policy of frank interchange of ideas among the service men as in vogue in the doings of the heads of the concerns who are members. Alvan MacCauley, Packard vice-president and general manager, advocated the establishing of a standard policy of service to the owner, saying that the service policy is vital and that much of the solidity of makers depends upon their saving some of the leakage through hap-hazard service methods and upon placing the service policy on a reasonable basis.

Committees will be named to report on the different questions brought up by the convention, the general undercurrent of opinion as shown by the discussions governing their findings. Tomorrow's session will end the meeting, and among the important topics up for attention are whether there should be different service policies for passenger and commercial vehicles and does free inspection and adjustment legally extend the manufacturers' warranty?

CARNATION AND KEETON SOLD AGAIN

Detroit, Mich., June 28—The Detroit Trust Co. receiver for the American Voiturette Co. which made the Car-Nation and Keeton cars, has sold the bankrupt concern's plant to Louis R. Grosslight, Detroit, and Isaac Gersen, Toledo, O. The plant and factory property were appraised at \$45,000 and it is said that this amount will be realized by the sale.

NEW U. S. L. CONCERN FORMED.

Albany, N. Y., June 28—Special telegram—The United States Light and Heat Corp., of Niagara Falls, was incorporated today, with a capital of \$7,000,000, and purposes to manufacture machinery and apparatus for production of light, heat and power. Directors are A. Stanley Jones, G. M. Walker and A. L. Fowle, all of New York.

The new company is to take over all property and assets of the old United States Light and Heating Co., valued at approximately \$2,500,000. The stockholders of the old company already have paid

in assessments amounting to \$472,000, and it is expected that before the new company begins business on July 1, at least \$525,000 will have been received.

The sale of the property of the United States Light and Heating Co. takes place at Niagara Falls on July 1 and the stockholders protective committee will bid for the property on that date, an amount probably slightly in excess of the \$750,000 of debts of the old company. It is the purpose of the management of the new company to eliminate the New York office, having its headquarters in Niagara Falls.

JOBBERS TO MEET IN CHICAGO

Chicago, June 28—The National Association of Automobile Accessory Jobbers will hold its next meeting in this city, July 21. The charter membership will remain open until that date, those coming in on this basis being relieved of the payment of the first quarter's dues. Encouragement has been received from both manufacturers and jobbers.

ACTIVITY IN TIRE CENTER

Akron, Ohio, June 26—Following the announcement by the Goodrich Tire & Rubber Co. that three new buildings, to cost approximately \$400,000 and providing work for 2,000 additional men would be built during the coming summer, it is noted that there is quite a boom in the tire-making plants in the Rubber City.

It is stated that buildings now under way and projected will provide some 20 acres more of floor space and will mean the employment of about 4,000 more men. Practically every factory is being operated to capacity. Many of them are employing night shifts and practically all are employing more men than ever before in their history.

The B. F. Goodrich Co. now is receiving bids for a huge eight-story warehouse, which will be completed in about 6 months. The Goodrich company normally plans to store 250,000 tires during the dull season and expected last fall to store 300,000 during the winter, but the rubber embargo compelled a change in the plans. The factory is now said to be behind in its orders.

The Firestone Tire & Rubber Co. has buildings under construction which will add about 40 per cent to the floor space. The Firestone company now has almost 6,000 men on its pay roll in Akron.

The building increases of the Goodyear company provide for an increase of the daily output from 12,000 to 15,000. The buildings are to be ready by fall. Between 7,500 and 8,000 men are now employed and some new men will be taken on.

The smaller factories also are having a

good increase in business. The Swinehart Tire & Rubber Co. has completed one new building and will have another completed early in July. These will enable the company to triple its capacity.

Some minor building is being done by the Kelly Springfield Tire Co. and the capacity at that plant is said to be about 1,000 tires daily. The Miller Rubber Co. is making additions to its plant, which will also increase the capacity. The number of employes of that plant is about 1,500, on day and night shifts.

The rubber factories at Cuyahoga Falls, Ohio, are also quite busy. The Falls Rubber Co. is erecting a four-story addition, while the Marathon Tire & Rubber Co. is engaged in construction operations. It is said that the Marathon company will soon employ 350 additional workmen.

HOOSIER S.A.E. ADOPTS CONSTITUTION

Indianapolis, Ind., July 25—With the adoption of a new constitution, the main provision of which is to allow for an extension of membership, the Indiana section of the Society of Automobile Engineers is looking forward to a large increase in numbers during the next few months. The new constitution was adopted at a meeting of the constitutional committee held Tuesday noon, June 22, at the Claypool hotel.

APPERSON TO BUILD AN EIGHT

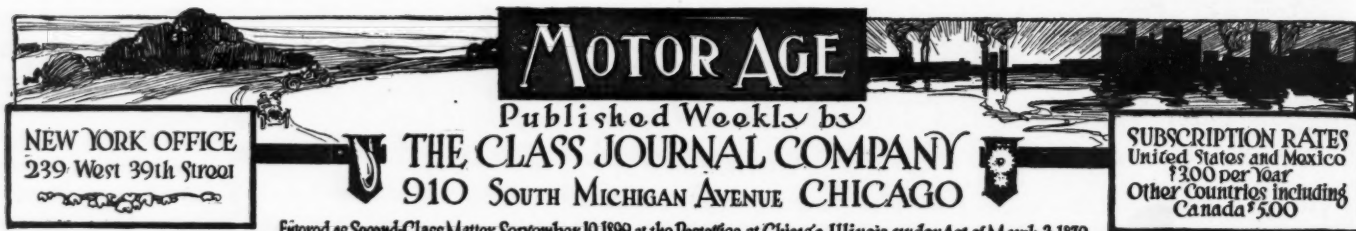
Kokomo, Ind., July 5—Completed plans for the 1916 line of Apperson cars include an eight-cylinder model to list at \$1,850 as a seven-passenger touring or four-passenger roadster, together with two six-cylinder cars. One of the latter is called the 6-16 at \$1,485 as a five-passenger and the other, the 6-60 at \$2,350 as a seven-passenger only.

The new eight, which will be described in detail in a subsequent issue of Motor Age, has a 128-inch wheelbase and employs a 31-8 by 5 motor.

MOTOR POSTAL ROUTES STARTED

Washington, D. C., June 26—With the carriers using their own cars, the installation of motor vehicles in the transportation of rural mail will begin on a large scale in many parts of the United States on August 2, according to an official statement of the postoffice department. From that date, 105 cars, carrying mail, will traverse more than 5,500 miles of rural post roads daily, except Sunday. The service is to be extended as rapidly as possible.

At the beginning, the carrier may use any machine with a carrying capacity of not less than 800 pounds and a cubic capacity of not less than 80 feet.



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The World's Fastest Track

CHICAGO now can boast of having the fastest motor speedway on the two hemispheres, faster even than the famous Brooklands which for years has stood as the epitome of the maximum velocity in course construction. Dario Resta, a descendant of a race noted for the speed of its chariots, made such a boast possible Saturday when he drove his Peugeot to victory in the first race run on the new oval, and hung up an unprecedented average of 97.58 miles per hour for the 500 miles.

SUCH phenomenal speed for the five centuries never before was attained in this country or in Europe. Not only did Resta smash the 500-mile record in his sensational sweep around the board oval, but he shattered as well the world's mark for three intermediate distances, the records for 200, 300 and 400 miles. Brooklands once boasted of all of these records, but the Briton no longer can brag of the English track's superiority in speed.

RESTA'S record is all the more remarkable in that his record-smashing time was made in the heat of competition, in which he was forced to steer around less fleet cars than his and shake off the challenge of desperate and cunning pursuers, and not in a trial run on an unobstructed course, the conditions under which the six-cylinder Sunbeam established the world's marks that the triumphant Italian shattered Saturday.

MOREOVER, his victorious car, the blue Peugeot, had been through the white-heat test of high-speed but 4 weeks before at Indianapolis and some of its stamina and vitality must have been spent at that time when Resta demanded every mile of speed that the car possessed in his efforts to overtake and defeat Ralph de Palma.

JUST how much more efficient the Peugeot was at Indianapolis than it was at Chicago probably will never be known. Perhaps it has an abundance of reserve speed and stamina that other cars lack, that even the Mercedes of de Palma did not have, as the race at Indianapolis proved when the 1915 winner drove the last two laps with a broken connecting rod and a hole in his crankcase.

AT all events, the showing of Resta's Peugeot at Indianapolis and Chicago marks it as the thoroughbred of motor thoroughbreds. De Palma's Mercedes rebelled at the speed demanded of it at the completion of 495 miles. The Peugeot has covered 1,000 miles in two contests, one at a speed of 89 miles an hour and the other at a 97.58-mile-an-hour clip, and has yet to ask for quarter from its resourceful driver from across the Atlantic.

IT will be called upon to travel 600 more miles in merciless competition on Saturday and Monday, being entered in the 300-mile event at Sioux City July 3 and the 300-mile contest at Omaha the following Monday. Should it finish inside the money in both of these races, it will be a remarkable achievement. For the assimilation of punishment, Resta's Peugeot has few equals.

A PECULIAR feature of this invincible and long-winded thoroughbred of steel is that it was condemned as slow a year ago by the French maker. It was one of four cars built especially for the 1914 grand prix, but in practice for the Gallie classic it did not show the speed of the other three and therefore was not started. Too slow for the grand prix, but the creator of a new world's record for 500 miles; what irony!

THE Chicago speedway race was a contest in which there were honors for more than one car and driver. The performance of Grant's Sunbeam was epoch-making. The six-cylinder English car, tooled by the veteran, established a non-stop record without parallel, completing the 500 miles on the same set of tires as it started out with and without a halt at the pits for mechanical adjustments or the taking of supplies. When Grant brought the car over from England a year ago for the 1914 Indianapolis sweepstakes, he had great faith in its ability to stand up under a high-speed strain and its low fuel consumption, but until last Saturday never was such faith justified, the car being eliminated by minor troubles in the various events in which it started.

GRANT is noted for his conservatism. He has been criticised for his tendency to run in the ruck and wait for the leaders to come back to him. Although he drove cautiously Saturday, he maintained a speed that few experts believed he would attempt, a speed of 94 miles an hour for the five centuries. Impetuosity did not cause the sudden switch in Grant's customary tactics. He was forced to open up. The Chicago track demanded speed, coaxed speed. It offered an opportunity for wide-open throttle driving without overtaxing the stamina of the motor that never has been offered before.

FOUR of the first ten cars to get the checkered flag bettered the Brooklands record for the 500 miles of 94.75 miles an hour and the ten drivers that divided the \$54,000 in prize money all made faster time than did Ralph de Palma in winning this year's Hoosier classic. This establishes beyond all doubt the claim of the Chicago speedway that it is the fastest course for motor car racing in the world.

IN fact, the Chicago track is too fast for the cars of the present day. Ray Harroun, the former race driver and the present head of the engineering department of the Maxwell company, is authority for the statement that the board oval of the windy city will permit a speed of 102 miles an hour for long distances. He also is of the opinion that there is no car in America at the present time equal to the task of testing the capabilities of the Chicago track to the fullest extent, and states that changes in design and the use of new materials will be necessary before the pinnacle of velocity will be reached on the colossal bowl of wood.

THE prediction now is common that 500 miles will be crowded into 5 fleeting hours in the next gasoline derby held on the Chicago speedway. When one considers that the 100-miles-in-an-hour record was not established until 2 years ago, it is not difficult to gauge the wonderful advancement.

Seek to Have Mammoth Cave Made a National Park

Uncle Sam May Buy Kentucky's Subterranean Curiosity Shop if
Appropriation Bill is Passed by Legislature

LOUISVILLE, Ky., June 26—Kentucky motorists are deeply interested in a bill appropriating \$1,000,000 to purchase Mammoth Cave, with surrounding territory, and convert it into a national park, which will be introduced on the opening day of the coming session of Congress. Its sponsors insist that Mammoth Cave and its environment furnish the making of the greatest national park in the country. Thousands of tourists visit the Cave each year.

Various societies and organizations at different times have suggested the acquisition of Mammoth Cave for a national park, and the bill will provide for acquiring the property by condemnation proceedings, if necessary.

Three aged women, all of them now over seventy, now own the cave and about 1,600 acres of land around it. A will drafted by Joseph R. Underwood, grandfather of Oscar W. Underwood, and at one time United States Senator from Kentucky, provided that on the death of the last of these three women the property shall be sold. It is hoped to place the United States in a position to be the successful bidder for the land when the owners pass away, or else to acquire it by condemnation. Much of the land in the neighborhood is in wild woods and the vicinity is unkept and run-down in many places. The belief is expressed that even on the basis of a \$1,000,000 investment it will prove a paying proposition to the government, through gate receipts and other sources of revenue which would accrue from it if it were converted into a national park.

ASK BIDS FOR POSTAL TRUCKS

Washington, D. C., June 29—Special telegram—Within the next few days the purchasing agent of the postal service of the United States government will issue a call for bids for furnishing approximately 100 trucks for city and rural delivery service. The conditions to be presented in the proposals will be such as to make it possible for every manufacturer of trucks to enter the competition. The date of opening of the bids in this city will be announced by the postoffice department later.

MOHAWK TRUCK CO. INCORPORATES

Ravenna, Ohio, June 25—The Mohawk Motor Truck Co. has been incorporated under the laws of Ohio with a capital of \$25,000, for the purpose of manufacturing motor trucks. The new corporation will take over the plant and personal property of the Ravenna Motor Truck Co., which has been in business for some time. At a meeting held recently, officers and stock-

holders decided to reorganize and to change the name of the concern.

In a statement given out by the officers of the company it was said that the plant would be operated 24 hours a day in the future. The incorporators of the new concern are S. C. Dougherty, E. E. Jones, E. W. Chapman, Herman Hill and W. K. Dougherty.

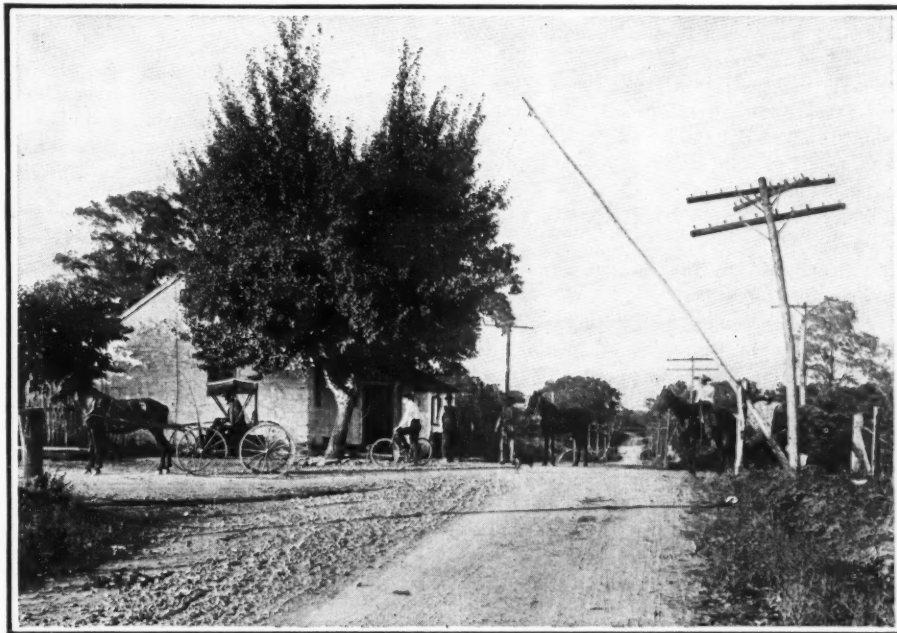
WANTS CAR DRIVERS EXAMINED

Baltimore, Md., June 24—That a physical examination be made of all applicants for motor car licenses and imprisonment be made the penalty for excessive speeding were suggested recently at a meeting held by residents of Rogers and South avenues, Mount Washington. The move followed the killing of Edwin H. Steuart, a

prominent resident of the Baltimore suburb a few weeks ago. The driver of the car which struck Mr. Steuart was found to be suffering from eye trouble. John S. Ensor, who is spoken of as a candidate for governor of Maryland, and who was with Mr. Steuart at the time of the accident, presided at the meeting.

Three committees were appointed: one to ask the Baltimore county commissioners to provide extra police for the avenues where the motor traffic is heaviest, one to suggest to State Motor Vehicle Commissioner Roe the advisability of a physical examination for all applicants for licenses, and one to act with community and improvement associations in having signs placed throughout Mount Washington, designating the speed limit of motor cars.

See America First —
• • • See America Now



EDITOR'S NOTE—This is the thirty-third of a series of illustrations and thumb-nail sketches of historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the picturesque points of interest in their own country.

NO. 33—HILMAN'S TOLL GATE ON THE SHENANDOAH VALLEY PIKE

STRANGE things happened during the civil war down in the Shenandoah Valley. Pillage and destruction more often are thought of in connection with this particular section of the battlefield than elsewhere, for there it was that Confederate generals laid the country waste and took possession one day, only to be displaced the next day by the Union forces, each side levying tribute upon those who lived in the community. Apparently there were a few who stood for their rights in the battle-scarred section, prominent among them being Mrs. Hilman, then keeper of the now historic toll gate just out of Winchester, Va., on the Shenandoah Valley pike, a part of the National highway from New York to Savannah, Ga. Mrs. Hilman stopped General Philip Sheridan's army and demanded toll for having passed over the pike. The illustration herewith shows the old toll gate as it is today. Fifty years ago this road echoed the beat of war-horse hoof and clank of sword and the boom of musketry. These have been displaced and in their stead comes motor touring de luxe

Gasoline War Causes Cut in Price

Reduction in Cost of Fuel General—Decline in 2 Years

ST. LOUIS, Mo., June 26—There is a gasoline price-cutting war on in St. Louis and surrounding territory, but in the opinion of the independent dealers it is only a sham battle between the Standard Oil Co. and the Pierce Oil Corp., with the two-fold purpose of freezing out the small dealers and at the same time cornering the oil surplus.

In 18 months, the price of gasoline has been reduced by 1 cent cuts from 17.5 cents a gallon to 7.9 cents. In each case, the cut first was announced by the Standard Oil Co. This usually was followed on the next day by the Pierce company's announcement of a similar cut. The independents, by necessity, then met the new price—only to be forced to meet another cut of 1 cent a few months later.

At present, the refined product is sold to the consumer here for 8.9 cents a gallon in lots of from 10 to 100 gallons. In 100-gallon lots—as it is bought by a majority of owners—gasoline is sold now for 7.9 cents. Quantity prices were introduced here only a few months ago.

A view of the so-called war, which is characteristic of local independent dealers, is given by F. C. Bretsnyder, of the Bell Oil Co., an officer in the national organization of independents:

"During the last 2 years there has been an overproduction of crude oil. This gave the Standard Oil Co. an excuse for cutting the price of the crude product gradually from \$1.05 a barrel to 40 cents a barrel, Pennsylvania crude from \$2.50 to \$1.35 a barrel.

"Standard Oil took advantage of the overproduction.

"The time came when, with each Standard Oil cut in the price of gasoline one or more small dealers went out of business. Even now the larger independent dealers are compelled to turn their business to other lines, such as lubricating oils, in order to survive the price-cutting sham battle between the Standard and Pierce companies.

"When these two companies get gasoline down to the price at which it will suit them to buy, they will corner all the surplus; then the price will begin to go up again."

Mr. Bretsnyder denied, however, that the independents are cooperating to facilitate the merchandising of their wares, except in so far as the export committees and organizations are concerned.

GASOLINE PRICES CUT IN DENVER

Denver, Colo., June 25—Special telegram—Gasoline is the lowest in the Rocky mountain region in 20 years, filling stations selling at 13 cents to garages and 13 to 17 cents by oil companies direct to consumers and 12 and 13 cents in 25-gallon

lots. The trade price is 11 cents. This is the second 1-cent cut in 6 weeks. Smaller companies claim the Standard started both and predict a further drop. Garages bought at 18 and sold at 22 cents 18 months ago.

MILWAUKEE GAS PRICE DROPS

Milwaukee, Wis., June 25—Milwaukee oil companies announce a reduction of 1 cent in the price of low-test gasoline, in common with reductions in other districts. The low-test gas, commonly called 60 per cent, now sells for 9.5 cents in 100 gallon lots, tank wagon delivery, and the filling station price, any quantity, direct into motor car tanks, is 10.5 cents.

GASOLINE TRUCE IN TWIN CITIES

Minneapolis, Minn., June 24—Quiet marks the gasoline market in the twin cities. After the Standard Oil Co. had reduced gasoline 1 cent and the independents had met the price at 10½ per gallon, no change has been noted. The leading independent dealers scout the idea of any price fight with the Standard, and they deny any knowledge of a business combination to be effected between the independents. A leading dealer lays the cut in price to over production of gasoline. He also said that the wet weather has had some effect in reducing general motoring and also that the war had reduced export, thus tending to an overplus of stock in the American

market. The Standard people said that discovery of new fields was one thing which brought the reduction.

CLEVELAND PRICES REDUCED

Cleveland, O., June 28—Following its action in Cincinnati, where the Standard Oil Co. of Kentucky reduced the tank wagon price on gasoline 1 cent to 11 cents, the Standard Oil Co. of Ohio has cut the price of gasoline in Cleveland from 13 cents to 12 cents a gallon, while the National Refining Co. has made a reduction from 14 cents to 13 cents.

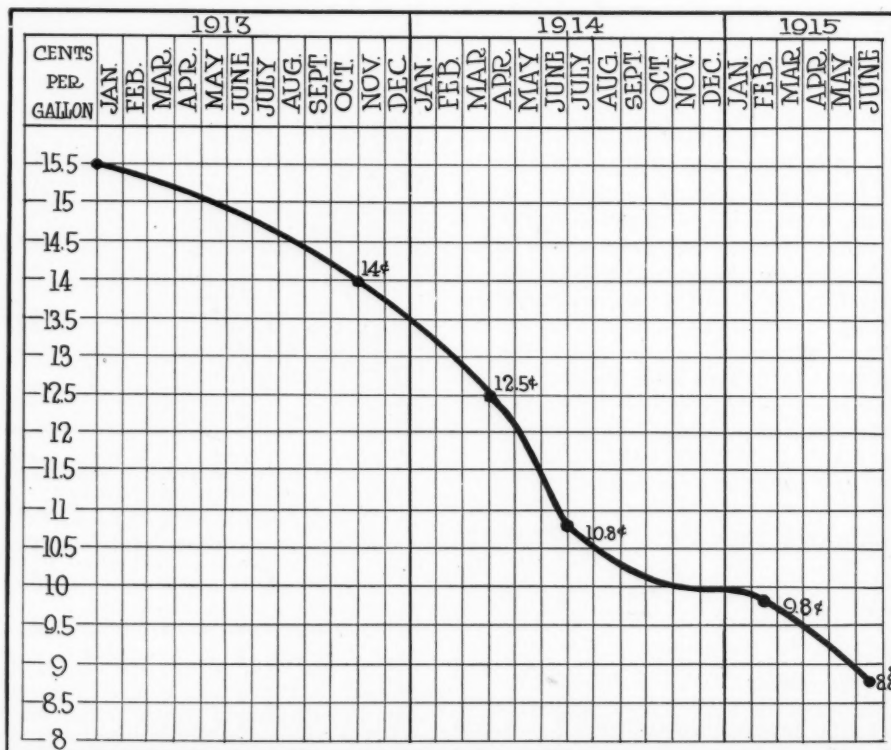
GASOLINE AT 3 CENTS A GALLON

Kansas City, Mo., June 25—The C. & C. Development Co., which owns the process and is making the machinery for refining gasoline that may be sold at half the current prices or less, it is claimed, has contracts for the installation of apparatus in several cities. L. B. Cherry is the inventor of the machinery; he is an electrical engineer, and electricity plays a part, it is said, in the transforming of crude oil into gasoline.

A demonstration plant has been established in Kansas City, and the first machine probably will be put to work soon making gasoline that can sell at a profit at 3 cents a gallon—if it works.

TUCSON RACE JULY 5

Tucson, Ariz., June 28—A 100-mile motor car race is to be held on the Southern Arizona fair grounds track July 5, under the auspices of the Borderland Automobile Club. There will be a purse of \$1,000, split 50, 30 and 20 per cent and a large entry list is expected.



DECLINE IN PRICES OF GASOLINE IN KANSAS CITY DURING PAST 2 YEARS AS CHARTED BY LOCAL STATISTICIAN

Packard Driver Humbles De Palma in Quaker Hill Climb

Johnson Wins Free-For-All Event at Uniontown, Former Italian Speed King
Finishing Sixth in Mercedes—Chalmers Also Victor

UNIONTOWN, Pa., June 26—Sensational speed marked the third annual summit hill climb on the National pike, from Hopwood to the summit of Chestnut Ridge, where Ralph de Palma, the speed king, and other nationally-known drivers raced last Thursday, June 24. All previous records were smashed by Charles Johnson, president of the local motoring association, who traveled up the mountain side, a distance of just 3 miles, in 3 minutes 27½ seconds. The average grade for the course runs 7.754 per cent and many of the contestants guided their cars around the sharp curves at Turkey's Nest, the Watering Trough and Point Lookout at better than 1 mile a minute.

Johnson, in his Packard Greyhound, defeated the world's champion. Many of the experts had picked him to win before the climb started, because of his familiarity with the road and his recklessness. The Greyhound, in practice, has clipped many seconds from the time it made Thursday, when, because of the immense crowd, estimated at about 30,000 persons, it was difficult to avoid running down spectators who stood in the course, hiding turns in the road. The committee also had warned all drivers to use particular care and to take no chances. De Palma, before he left, said the winner gave the finest exhibition of mountain racing he ever saw.

The grand prize in the big event was \$600. De Palma finished sixth, owing to a broken magneto in his car and to the fact that he slowed down his car at times to avoid hitting spectators.

In the second event, open only to cars with a piston displacement of 230 cubic inches and under, A. E. Walden, driving a Chalmers car, was first, his time being 3:50. The prize was \$100.

To Become a Classic

The annual hill climb is held under the direction of the Uniontown Motoring Association. It is planned by the association to make the climb in future years the classic of its kind in the United States. De Palma, Joe Dawson and other famous pilots already have promised to be on hand next year. Dawson was present with his Marmon car this year, but did not race, as scheduled.

Last year a man was killed and a number of persons injured, but not an accident marred the day last Thursday. Crowds thronged Uniontown in the evening and the racers were guests at numerous social affairs. Every hotel was filled and the night before the races about 3,000 cars were camped along both sides of the course, where the passengers spent the night.

An invention for timing the cars was



WALDEN, IN CHALMERS, WINNING 230-INCH EVENT AT UNIONTOWN

tried out on the occasion and received much favorable comment. It is a highly charged electric wire, conceived by A. M. Crichton, manager of the Tri-State Telegraph & Telephone Co., which crossed the track at start and finish and automatically registered the time made to the fraction of a second. Summaries of the events follow:

230 CUBIC INCHES AND UNDER

A. E. Walden, Chalmers, first. Time—3:50.
M. A. Crocker, Saxon, second. Time—4:04.
A. D. Spencer, Buick, third. Time—4:04½.
C. M. Hansel, Maxwell, fourth. Time—4:14½.
Ralph DePalma, Hispano, fifth. Time—4:30½.
E. Beequeet, Morse, sixth. Time—6:09½.
Guy Woodward, Ford, also ran.

FREE-FOR-ALL

C. W. Johnson, Packard, first. Time—3:27½.
I. P. Fetterman, Simplex, second. Time—3:46½.
William Poffenberger, Marmon, third. Time—3:47½.
A. E. Walden, Chalmers, fourth. Time—3:48½.
J. W. Dickinson, Dickinson Special, fifth. Time—3:54½.
Ralph DePalma, Mercedes Special, sixth. Time—3:55½.
Roy Stenz, Buick 16, seventh. Time—4:15.
H. E. Cupps, Lozier, eighth. Time—4:16½.
T. S. O'Rourke, Overland, ninth. Time—6:13½.
Joseph Boyer, Jr., in a Hispano Sulza; G. B. Gardner in the Beaver Bullet; Alva Hughson in a Haynes and Joseph J. Ryan in a Mercer also started.

DODGE BROTHERS FIGHT SURTAX

Washington, D. C., June 26—Counsel for John F. and Horace E. Dodge, Detroit motor car manufacturers, yesterday filed a brief for argument before the United States Supreme Court attacking the surtax on income of individuals under the federal income tax law. This is the first attack to be made on the constitutionality of this law.

Three main reasons were assigned for claiming the surtax provision of the law is invalid. Stockholders in corporations, it is asserted, when computing their sur-

taxes, are subjected to liability for the gains and profits of the corporations which have not been divided or distributed. "To tax a stockholder on prospective dividends which he may never receive can only be properly characterized as so utterly absurd as to induce levity," the brief declares. The case was begun to prevent the collector of internal revenue at Detroit from collecting a surtax on each of the Dodges of approximately \$45,000 for the year 1913. The federal district court in Michigan held the tax to be valid.

BRIGGS-DETROIT BANKRUPT

Detroit, Mich., June 28—The Briggs-Detroit Co., manufacturer of the Detroit cars, was today declared bankrupt in the bankruptcy court. Saturday, June 26, Judge Tuttle, of the United States district court, appointed the Detroit Trust Co. receiver for the company.

According to officials of the trust company, the inventory of the assets and liabilities of the Briggs-Detroit Co. will not be completed for several days, but they estimate that the total amount of the liabilities will figure at between \$350,000 and \$400,000, and the assets at \$150,000.

MORE LOZIER DIVIDENDS

Detroit, Mich., June 28—Within a few days the Detroit Trust Co. will pay a second dividend of 5 per cent, amounting to about \$175,000, to the creditors of the old Lozier Motor Co. About 2 months ago the first payment of a 5 per cent dividend was made by the trust company to Lozier creditors.

Motors' Roar to be Heard in Three Cities Over Fourth

Sioux City, Omaha and Tacoma Will Celebrate National Holiday with Speed Meets—Drivers Leave Chicago to Seek Western Fields of Conquest

CHICAGO, June 29—Mercury, god of speed, checked out of Chicago this morning and headed westward to pay his respects to the residents of Sioux City, Iowa, Omaha, Neb., and Tacoma, Wash., where during the Fourth of July holidays fetes will be given in his honor.

The Sioux City 300-mile race, which had its inception last year when it was won by Eddie Rickenbacher in a Duesenberg, is the first contest on the national holiday calendar, motors and exhausts adding their din to that of the festive cannon cracker there Saturday. The Tacoma meet is scheduled for Sunday and Monday of next week when three races will be run on the new Pacific northwest speedway, the 100-mile Intercity and 200-mile Potlatch trophy being held on the first day and the 250-mile Montamarathon on the second day of the Mercurian carnival. Tacoma and Omaha conflict July 5, for on Monday the new speedway on the outskirts of the Nebraska metropolis will be dedicated with a 300-mile contest.

Off to Sioux City

The majority of the cars and drivers that participated in the speed slaughter on the Chicago speedway Saturday have been entered in both the Sioux City and Omaha races. The pilots shipped their cars yesterday and the general exodus of the speed merchants from Chicago began today. After chasing the \$15,000 in prize money at Sioux City, the drivers will make a regular theatrical jump to Omaha in order to contend for the \$15,000 purse that is offered there for the inaugural race on the 1-mile board track.

Three of the drivers that competed at Chicago will pilot cars at Tacoma. They are Earl Cooper, Bob Burman and Billy Carlson. All three left for the northwest Sunday morning. Burman and Carlson shipped their cars by express while Cooper had only Mrs. Cooper to care for, his Stutz already being on the Pacific coast and awaiting his arrival.

Dario Resta, winner of the Chicago race, will be the headliner both at Sioux City and Omaha while Burman, Cooper and Carlson will have to divide the glare of the spotlight with Barney Oldfield at Tacoma. The cigar-chewing veteran is now on the course and warming up the No. 9 Peugeot with which Resta won both the Vanderbilt cup and grand prize races at San Francisco this spring.

The following twenty-two entries have been received for the Sioux City race:

Peugeot, Resta; Maxwell, Rickenbacher; Maxwell, Orr; Duesenberg, Alley; Duesenberg, O'Donnell; Duesenberg, Haupt; Erwin special, Grover Bergdoll; Erwin special, driver unnamed; DuChesneau, W. W. Brown; Mals special, Mals; Sebring, Joe Cooper; Emden, Grant Donaldson; Mulford special, Ralph Mulford; Ogren, Chandler; National, Butler; Chalmers, Wetmore; White, Shrunk; O'Connell special, driver unnamed; Anderson special, Scott; Berwyn Baby, Zucher, and Donaldson special, Lou Donaldson.

The prediction is common that Rickenbacher's average of last year, 78.6 miles an hour, will be shattered by the winner of the Sioux City race as the 2-mile track of gumbo, hard-packed and oiled, is much faster than in 1914 and the cars entered have shown greater velocity this season than those of last year.

The inaugural race on the new Omaha speedway has attracted the following array of talent:

Peugeot, Resta; Maxwell, Rickenbacher; Maxwell, Orr; Mercer special, Otto Henning; Ogren, Chandler; Mulford special, Mulford; Duesenberg, Alley; Duesenberg, O'Donnell; Duesenberg, Haupt; Sebring, Joe Cooper; Delage, Chevrolet; Erwin special, Erwin Bergdoll; Erwin special, driver unnamed, and Stutz, Gil Anderson.

The three Knight-motored F. R. P. cars were entered at Omaha but yesterday were withdrawn by Finley R. Porter, their designer, who shipped them back to Port Jefferson, N. Y., to install new engines. Porter has engaged Porporato, the Italian who finished second in the Chicago classic, to supervise the work of rebuilding the cars. Porporato has had a great deal of experience with the Knight motor, having driven one of the Minerva-Knights in the 1914 Isle of Man race in which he finished second to K. Lee Guinness, the Sunbeam pilot.

Just what speed will be made at Omaha is a much-mooted question with the railbirds and one that will not be answered satisfactorily until the checkered flag waves over the victor. The banks of the 1-mile speedway are very steep.

Field for Tacoma

The field for the Tacoma meet is made up largely of western drivers and cars that have made racing history in the Pacific coast classics for the past 2 years. The entries for the three races are as follows:

Montamarathon—Peugeot, Oldfield; Peugeot, Burman; Mercer; Pullen, Mercer, Ruckstell; Stutz, Earl Cooper; Stutz, George Hill; Stutz, Earl Lewis; Maxwell, Carlson; Parsons special, Parsons; Gordon special, Elliott; Romano, Ray Lentz; Marmon, Reynolds; National, McGoldrick, and Schneider special, Schneider.

Potlatch trophy—Peugeot, Oldfield; Peugeot, Burman; Stutz, Earl Cooper; Mercer, Pullen; Stutz, Lewis; Stutz, Hill; Mercer, Ruckstell;

Maxwell, Carlson; Parsons special, Parson; Gordon special, Elliott; Romano, Lentz; Marmon, Reynolds; National, McGoldrick; Schneider special, Schneider; Stutz, Hendricks; Velie, Neep; Malcolm special, Malcolm, and Mercer, Stratton. Intercity—Parsons special, Parsons; Gordon special, Elliott; Romano, Letz; Marmon, Reynolds; National, McGoldrick; Schneider special, Schneider; Stutz, Hendricks; Velie, Neep; Mercer, Thomas; Malcolm special, Malcolm; Mercer, Stratton, and Buick, Forbes.

The Tacoma races will mark the first competition of the Mercers since early in the spring, the 300-inch Mercers constructed for Indianapolis and Chicago being scratched because they could not stand the high-speed strain, lack of Belgian steel resulting in weak parts. Pullen will drive the Mercer which won the grand prize in 1914 and Ruckstell has the Mercer which established the world's road racing record of 87.7 miles an hour at Corona last Thanksgiving day.

The Tacoma speedway is the former road racing course. It has been boarded over with two-by-fours and covered with a thin coating of liquid asphalt. It is very fast, Dave Lewis traveling at a speed of 98 miles an hour in a practice lap just after it was completed.

Three new sections have been added to the grandstand which now will hold 12,000 persons. This addition was deemed necessary by the management on account of the large number of reservations which already have been received. The parking spaces for cars in the infield have been increased to 200.

KANSAS CITY WANTS SPEEDWAY

Chicago, June 26—Twenty residents of Kansas City, Mo., who are engaged in the promotion of a company to build a speedway in their city, arrived in Chicago this morning to witness today's 500-mile race and study the construction of the local board track. The expedition was under the auspices of the Mid-Continent Exposition Association which plans to build a 2-mile motor track of wood at the official stopping place of the transcontinental balloon races and at a strategic point on the National Old Trails highway.

ELGIN RACE BLANKS RECALLED

Chicago, June 28—The entry blanks for the Elgin road races, scheduled for August 20 and 21, were recalled today by Chairman George Ballou of the contest board of the Chicago Automobile Club in order to incorporate in them the change made recently in the A. A. A. three-car rule, which was amended to permit five cars to start in any race provided only three are nominated by the manufacturer. The blanks will be reissued this week.

CHICAGO PLANS FALL RACE

Chicago, June 29—Encouraged over the success attendant upon the inaugural race run over the new track Saturday, the directors of the Chicago speedway now are contemplating the promotion of another contest in the fall and have requested Chairman Kennerdall of the A. A. A. contest

board to reserve October 9 for such an event and he has done so.

According to present plans, the fall race will be 300 miles in length and \$25,000 in prize money will be hung up. October 9 falls on Saturday and is a municipal holiday as it commemorates the great Chicago fire of 1871. The start will be after the noon hour in order to take advantage of the half-holiday Saturday in hopes of increasing the attendance.

Although the New York race is 1 week previous to the Chicago date, the promoters anticipate no difficulty in obtaining entries as the majority of the drivers who competed in Saturday's speed massacre have promised to return here in the autumn. They will have a week in which to ship their cars from the east and tune them up.

MAXWELL SPEED LABORATORY

Chicago, June 28—Believing that the Chicago speedway offers unexcelled advantages for testing motor cars, Ray Harroun, the former racing driver who is now head of the engineering department of the Maxwell Motor Co., Detroit, has made arrangements to establishing an engineering laboratory at the local track and this summer will try out all the new models on the 2-mile board oval.

TWIN CITIES AFTER ENTRIES

Minneapolis, Minn., July 26—Notwithstanding opposition for fear of conflict of attractions with the 2-day race program at the dirt track at Hamline, the Twin City Motor Speedway management will adhere to its original plan of putting on the first annual Twin City 500-mile race the first Saturday in September.

Application blanks were put out this week. Other than that Resta will be entered, there is no definite information regarding the speed pilots who will be in the race. Elimination trials will come the week previous. One circuit of the 2-mile track at 80 miles an hour is the test. The winner of the race will get \$20,000 and the remaining \$30,000 will be divided.

Construction work on the concrete track is proceeding rapidly. Work on the grandstands will begin at once. The grounds are inclosed with a 10-foot fence and the track will be ready by August 15.

WOMEN TOURISTS IN NEVADA

Eklo, Nev., June 25—Eight transcontinental motor parties passed through Elko during the week. In one party were Mrs. R. D. Rendon, Mrs. Albert Dunson, J. W. Allen and W. S. Spiney, who have driven all the way from La Grange, Ga. They say that the trip has been a delightful one and that they enjoyed every day of it despite the mud encountered. From Butte, Mont., two cars passed through containing Munica Brady, Ellen Kelly, Elizabeth Kelly and F. A. Roth. Another party consisting of Mrs. D. J. Boasfield and Mrs. C. T. Cabaniss, of New York State, passed through during the week.

Officials of Three Tracks Form Speedways' Association

Co-operative and Mutual Protection Organization Perfected by the Issuance of Incorporation Papers—Twin Cities, Indianapolis and New York Represented

CHICAGO, June 25—Seven representatives of the Indianapolis, New York and Twin City speedways met here this afternoon, adjourned to meet at Hammond, Ind., this evening and there effected the permanent organization of the Speedways Association of America by filing incorporation papers with the secretary of state of the Hoosier commonwealth and electing officers and a board of managers.

The Speedways Association of America was born at Indianapolis just prior to this year's Hoosier classic. Representatives of the Indianapolis, Twin City, New York, Tacoma, Sioux City, Omaha and Chicago tracks were in attendance and a temporary organization was effected. Not until the association had been incorporated, however, was the organization in a position to start its campaign for the advancement of the sport of speedway racing, and to take such important action was the purpose of today's session.

Edward E. Gates, chief attorney for the Federal baseball league and a resident of Indianapolis, acted for speedways association, drawing up the incorporation papers and filing them this morning. As soon as word was received that incorporation papers had been granted, the seven representatives boarded a train for Hammond, where the first stockholders' meeting was held, the incorporation laws of Indiana stipulating that a company incorporated in that state must hold its first stockholders' meeting within the boundaries of that commonwealth.

At the stockholders' meeting, a constitution and by-laws were adopted and the following officers elected:

President, Charles W. Sedwick, Indianapolis; vice-president, James C. Nichols, New York; secretary and treasurer, James A. Allison, Indianapolis.

Board of managers—Carl G. Fisher, Indianapolis; James A. Allison, Indianapolis; F. H. Wheeler, Indianapolis; Charles W. Sedwick, Indianapolis; James C. Nichols, New York; Dr. C. E. Dutton, Minneapolis; and D. L. Wheeler, Minneapolis.

Although Chicago, Tacoma, Sioux City and Omaha were not represented at today's meeting, officials of these four tracks agreed to become members of the association at the time of the Indianapolis session and admission blanks have been sent them. As soon as they apply for admission, the board of managers will be changed in order that these four tracks may have representation on the executive board.

The chief aim of the speedways association is that of mutual protection and co-operation and its motives are not antagonistic to drivers as many have been lead to believe. It is to be to speedway racing what the national commission is to baseball. Each year it will adopt a schedule so that there will be no conflicts in dates. It also will be in a position to buy racing cars, a very scarce commodity at the present time, and will appoint a representative to visit Europe and engage foreign drivers not for one race but for all contests promoted during the season. It will also classify tracks and put a stop to the practice of one promoter hanging up a larger purse than another in order to attract entries.

The paramount aims of the new organization are best expressed in the following excerpts from the speedways association by-laws.

1—The objects of the association are to govern, contract and manage speedways for speed contests or other exhibitions.

2—To secure the co-operation and participation in the same.

3—To encourage and promote the development, use and sale of motor cars and to promote speed contests as a pastime in America and other countries, and to surround it with safeguards such as will insure public confidence in its integrity and methods; improve the standard or skill and sportsmanship of the participants therein.

4—To establish uniform rules and regulations for such speed contests and exhibitions and for the safety of the drivers and public.

5—To protect the property rights of those engaged, without sacrificing the spirit of competition.

6—To promote the welfare of drivers, mechanics, and other participants, by developing and perfecting them in their profession, and aiding them in securing adequate compensation for expertness; to protect and aid them to secure prizes.

7—To schedule dates and places for speed contests and exhibitions.

8—To foster and encourage the engaging of foreign entrants.

DES MOINES RACE JULY 31

Des Moines, Ia., June 28—The builders of the Des Moines' speedway, now under construction, have decided upon July 31 as the date of the inaugural race meet. The 1-mile track is being constructed of two-by-fours and is 44 feet wide, the grandstands will seat 8,000 persons and the parking spaces will accommodate 7,000 cars. The cost of the plant, including the land, is \$125,000. The speedway is being built under the supervision of Jack Prince. Henry R. Gering and Samuel Orloff, both of Omaha, Neb., are at the head of the company constructing the plant.

Transcontinental Touring Shown at Various Gateways

President Joy Praises Nebraska Section of Lincoln Highway—Crosses Continent Twice in Four Months—Many on Way Back From Fair

RENO, Nev., June 25—Henry B. Joy, president of the Lincoln Highway Association, spent a night recently in Reno, leaving the following morning for Carson City, thence to Lake Tahoe and on to San Francisco. He had been forced to travel slowly as the roads to the east of here were not in the best of shape. He arrived here the nineteenth day after his departure from Detroit. Mr. Joy talked of the problems of the Lincoln Highway Association, saying little of the twin six Packard, which he is testing out on the trip.

"The greatest part of the highway between Detroit and Lincoln is in good condition," he said, "and rapidly is being improved. We don't expect to have the transcontinental highway completed in a year, but good progress is being made. The rains are the greatest obstacle to travel. In Iowa, Indiana and Nebraska, the flat country becomes very difficult for motor car travel during the rainy season."

Joy is keenly alive to the difficulties of Nevada in maintaining good roads, when there is a population of only 80,000 in the state. He said the eastern tourists did not expect a boulevard across the desert. While in Carson City Joy made a statement for publication, saying that he favored the Kern Canyon route to the coast.

FORDING TO FAIR

Reno, Nev., June 25—During the week one particularly notable call was that made by E. Wilcox and wife, who had made the trip from Syracuse, N. Y., across the continent in a Ford. They left Reno on their way to Portland, Ore. Mr. Wilcox said they had had no trouble of any kind on the trip and their Ford showed no signs of the heavy travel to which it had been put. Another long-distance caller was Bert P. Mill, of Idaho Falls, Idaho, who, with his family, is making the trip to San Francisco in his Ford. The machine was giving perfect satisfaction.

TWO TRIPS IN 4 MONTHS

Los Angeles, Cal., June 25—Arriving with his family of five and loaded down with excess baggage, Albert Horstman, of Scranton, Pa., piloted his Hupmobile into Los Angeles recently completing his second transcontinental trip since the opening of the exposition at San Francisco. Horstman has extensive mining interests in Nevada and Arizona and made his first trip a few months ago with a squad of eastern mining engineers arriving in San Francisco in time for the opening. Only a few days were spent at the fair. Horstman started east by way of Carson City where his companions stopped for analyti-

cal work. Upon his return to Scranton, Horstman sold the family home in that city and brought his family to California where they will locate permanently.

TOURS LINCOLN-ELDORADO ROUTES

Los Angeles, Cal., June 25—Prof. R. O. Graham, supervisor of manual arts at Malad, Idaho, with his wife, arrived here in a 1915 Overland. From Salt Lake City the Lincoln highway was followed as far as Ely, Nev., and from there the El Dorado trail brought them to Los Angeles via Tonapah and Goldfield. The roads in Utah were found to be in poor condition but in Nevada and California good roads prevailed practically the entire distance.

NOMADS REACH RENO

Reno, Nev., June 25—Sam Megoffin and Andrew Berkey, tourists from St. Paul, Minn., are spending several days in Reno. They drove across the continent in their big car to Seattle, then cut through Washington and Oregon to Reno, where they are visiting a former schoolmate, Jay W. Cran. They will proceed to San Francisco in a few days.

EASTERN AND WESTERN TOURING

Reno, Nev., June 25—Among the many visitors here during the week were J. T. Dalby and wife of Creston, Iowa. They had visited the fair at San Francisco and were on their way to their home in Iowa, driving their Studebaker 25.

Albert Robinson and wife and three

children from Middle Creek, Ore., in their 1915 Studebaker four, dropped in on their way to Winnemucca, where Mr. Robinson intends to settle on some land.

Judge George R. Harvey, wife and two sons from the Philippine Islands, in their 1915 Studebaker four, were visitors during the week. The judge and his family are in the United States on a vacation and will return to the Philippines in September. He says he purchased the car in the Philippines and brought it to this country when he came over several months ago. When the car lands in the islands again, it will have made the trip across the water three times.

COMING INTO HOMESTRETCH

Carson City, Nev., June 25—Mr. and Mrs. A. A. Bontaiger and child, of Waterloo, Iowa, passed through Carson City recently on their way home. They motored to the exposition and are returning to Iowa in the same manner. Other visitors passing through Carson by motor in the last two days were: C. B. Taylor, wife and child, of San Francisco, who are on their way to Billings, Mont.; W. M. Scoffgos and Ray Millikin, en route from Seattle to St. Louis, and E. H. Walsh and J. H. Wise, accompanied by their wives, driving a Kisselkar, enroute to their Colorado home.

START ON 3-MONTHS TOUR

Los Angeles, Cal., June 25—J. E. Markwell and wife, M. Markwell, J. F. Teel and wife, Miss Ruth Teel and F. W. Campbell, all of this city, left today on a 3-months' motor tour which is to include visits to the cities along the Pacific coast, the Yellowstone National Park, Salt Lake City and Denver. The party left in three Oldsmobiles purchased especially for the tour and this gives reason to believe that California will send out many transcontinental tourists this season who have seen the Golden State and are following the See America First suggestion.

MOTORISTS REACH LOS ANGELES

Los Angeles, Cal., June 25—Among the transcontinental motorists arriving in Los Angeles during the week were: Lewis Wallace, of New York City; S. G. Seager, of Hazleton, Pa.; John F. Downing, a college professor of Minneapolis, Minn.; J. E. Davidson, former manager of the Business Men's Club, Chicago; Thomas McGeorge, former manager of Bradstreet Co., Des Moines, Iowa; Herbert L. Moses, attorney, of Rapid City, S. D.; and A. L. Pendergrass, of Helena, Ark. The majority of these motorists came to the coast over the National Old Trails highway.

FORECAST: "NO RAIN"

TOURISTS planning to start their transcontinental trip soon after July 1 will be cheered by the information that the rains which recently have been so heavy west of the Mississippi and Missouri rivers practically have ceased and the prophets predict dry weather for several weeks.

While rains have put the roads in the middle west in very bad condition in some places, well-organized road and route associations are working their crews vigorously, dragging and repairing. Saturation by rain, followed by immediate dragging, gives this class of roads an excellent surface.

Transcontinental touring to date is in greater volume than the most sanguine predicted early in the season. The north and central routes now are coming into their own and probably will be the favored ones to carry the burden of traffic during the hot months. All during the spring these routes have been worked upon in anticipation of heavy traffic and they are in first-class condition for touring.

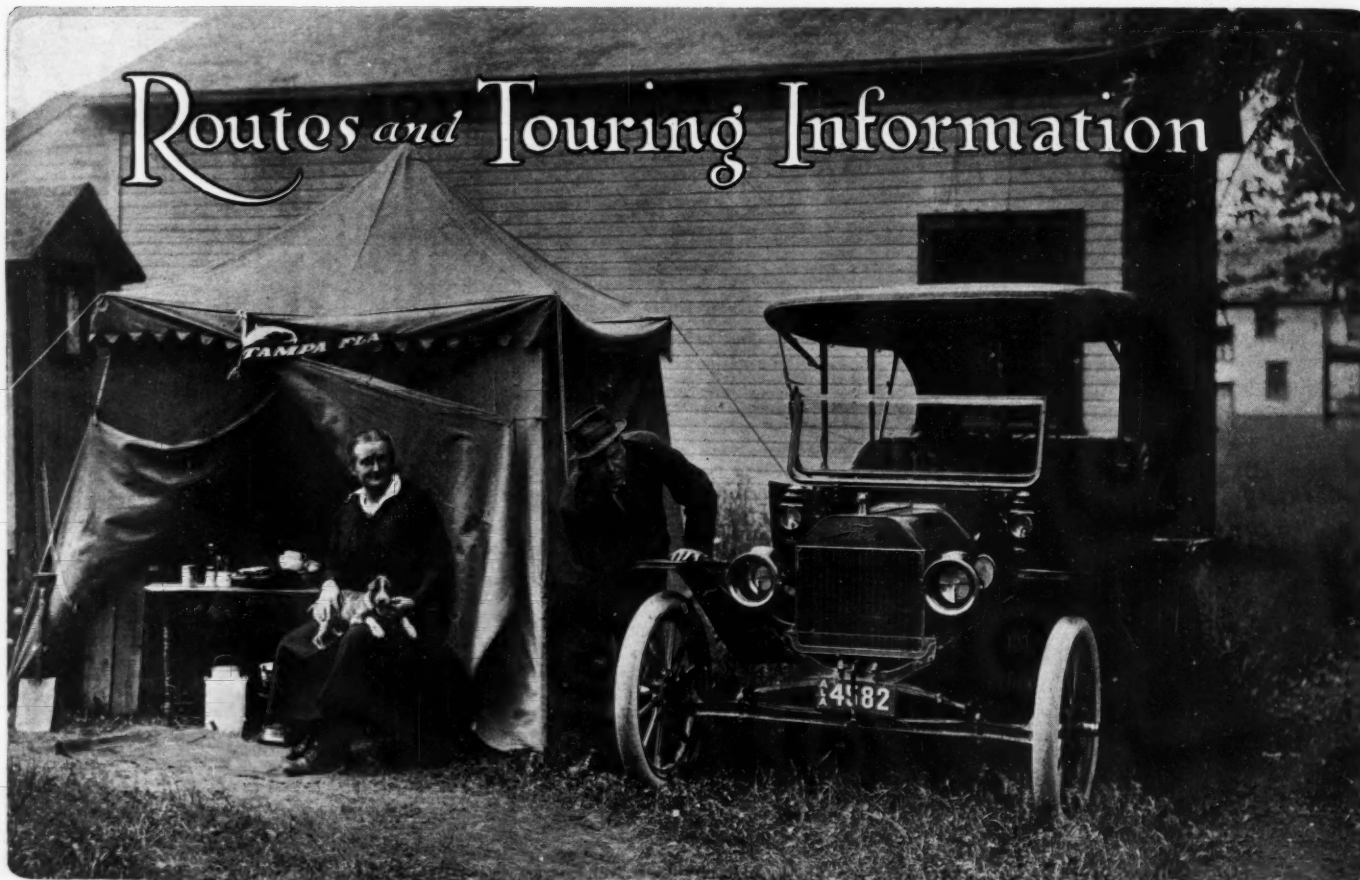
Straight Tips on Transcontinental Trails

Latest Reports on Road Conditions from Those Who Know

HOT OFF THE WIRE

Cheyenne, Wyo., June 29—Special telegram—There are some rough spots on the Lincoln highway through Nebraska and Wyoming, but in general the road is fast. Branch roads to Colorado points leaving the highway at Cheyenne are excellent.—Cheyenne Motor Club.

- McCOOK, NEB.** June 27—To Sterling, Colo., generally good. Omaha-Lincoln-Denver route very good. This road was negotiable after the hard rains when the other routes were not. However, all routes are getting better every day now and barring heavy rains will be good all summer.—D. G. Devine.
[Omaha-Lincoln-Denver Route]
- ELY, NEV.** June 25—Road to Salt Lake City and to Goldfield is in good condition. Good time can be made.—Ely Garage and Supply Co.
[Lincoln Highway]
- DES MOINES, IA.** June 25—Sunshine, with just enough showers to make the roads workable with drags during the last few days, has resulted in putting the main traveled dirt roads in Iowa in good condition.—George Botsford, Secretary, Des Moines Chamber of Commerce.
- DICKINSON, N. D.** June 25—From Bismark to Helena, Mont., road is in good condition. This route is kept well dragged and is marked. The bridge across the Missouri at Medora, N. D., has been difficult to cross when the water was high, but the Northern Pacific railroad is assisting tourists by carrying several motor cars across its bridge at a time on flat cars. A steel and concrete bridge will be built soon.—John Orchard, Secretary, National Parks Highway Association, Inc.
[National Parks Highway]
- BISMARCK, N. D.** June 25—Roads east of here to Fargo are improving with dry weather after recent hard rains and within a week should be in excellent condition.—Fred L. Conklin.
[National Parks Highway]
- POCATELLO, IDA.** June 25—Road to Ogden good; fair time can be made, the only difficulty being a few stretches where repairs are being made. The state is building a highway through Idaho, but these rough places are not very long and do not inconvenience the motorist to any extent. To St. Anthony and on to the Yellowstone much road work is in progress and for that reason touring is not so good over that part of the route. To Boise and over the north and south routes roads are good.—Trist Automobile Co.
- ST. ANTHONY, IDA.** June 25—Have just been over the route to Pocatello and Yellowstone to the western entrance to Yellowstone Park and found the road very good. From here to Pocatello, 94 miles, road is kept in good condition by the various counties through which it passes. From here to the divide and on to Yellowstone, much work has been done and the road is dry and hard. William D. Yager, Yager Auto Livery.
- OMAHA, NEB.** June 26—The 392 miles of the Lincoln highway through Nebraska is in fair condition and better marked than the parts of this route through Iowa, Illinois and Indiana, according to a telegram from President Joy, of the Lincoln Highway Association, after having reached the western state line last week. Nebraska is anxious to put its part of the Lincoln highway in such condition that motorists will refer to it as the greatest boulevard in the world.—S. E. Smyth, Omaha Automobile Club.
[Lincoln Highway]
- LAMONI, IA.** June 24—The Interstate trail, which is the principal road between Des Moines, St. Joseph and Kansas City, soon will be in better condition than ever before, as many permanent repairs have been made and great interest is manifested all along the route in dragging. Once the wet weather is over this route will compare favorably with any road in the country. It is well marked.—Lamoni Auto Co.
[Interstate Trail]
- GRAND JUNCTION, COLO.** June 25—Road to Grand Junction and Salt Lake City is good. The bridge over the Price river at Woodside has been completed. The dug-way road in the Price river canyon between Price and Colton is much improved. Road is a little rough in one place between Price and Woodside, but a detour has been arranged to avoid this. To Colorado Springs, Pueblo and Canyon City, via Monarch or Cochetopa Pass to Gunnison and Montrose is good. No cars have been over Berthoud Pass so far this year. Telephone booths have been installed along the Midland trail where there are no farm houses. These will be of aid to motorists.—L. Antles, Secretary-Treasurer, Midland Trail Association.
[Midland Trail]
- CHILLICOTHE, MO.** June 25—Pike's Peak trail through here fair. While we have had considerable rain, cars are passing through with little difficulty. It has been too wet to repair damage due to rain, but withal motorists find roads passable. Ninety per cent of the roads in this vicinity are in good condition and with clear weather there will be no trouble in this section on the Pike's Peak trail, or Chicago, Kansas City and Gulf highway.—C. F. Adams, President, Pike's Peak Ocean-to-Ocean Highway Association.
[Pike's Peak Trail]
- COLORADO SPRINGS, COLO.** June 25—From here to Salt Lake City road in general is in good condition. We have had nearly 2 weeks of settled weather which has done wonders for our roads, and from here to St. Joseph the Pike's Peak trail has enjoyed the advantages during recent rains by reason of its location on the divide.—A. W. Henderson, Secretary-Treasurer, Pike's Peak Ocean-to-Ocean Highway Association.
[Pike's Peak Trail]
- SPRINGVILLE, ARIZ.** June 25—Roads through New Mexico and Arizona to the Petrified Forest and Grand Canyon are good; weather dry and pleasant. From here to Globe and Phoenix road is passable. Rough in few places, but will be good in a week or two.—G. Becker, President, Becker Mercantile Co.
[National Old Trails Highway]
- FLAGSTAFF, ARIZ.** June 25—Roads east and west of here as well as the road to the Grand Canyon and other points in territory contiguous to Flagstaff are in fine condition.—Babbitt Brothers.
[National Old Trails Highway]
- ALBUQUERQUE, N. M.** June 25—From Kansas City to Trinidad the National Old Trails route is good. Weather warm and clear. From Trinidad, over Raton Pass, to Raton, Las Vegas and Albuquerque, roads good, streams bridged, no sand, weather good. From here to Socorro, Magdalena, Springville and Holbrook good, no sand. From Holbrook to Flagstaff, Grand Canyon, Ash Fork and west, following the Santa Fe railroad, crossing the Colorado river at Needles, good travelable condition. From Needles, across the Mojave desert, to Barstow, San Bernardino and Los Angeles road is good and by crossing the desert at night tourists will have a comfortable trip. No detours necessary along the entire route from Kansas City to Los Angeles.—D. K. B. Sellers.
[National Old Trails Highway]
- SAN FRANCISCO, CAL.** June 25—There is little choice between the coast and inland routes from here to Los Angeles so far as condition of roads is concerned, as either route is in good condition at present.—Automobile Club of Southern California.
[Coast and Inland Routes]
- OAKLAND, CAL.** June 25—The roads between Oakland and Los Gatos are in excellent condition and from Los Gatos to Monterey, via Santa Cruz, good. Between Santa Cruz and King City some work is being done, but the road for the most part is in good shape. From King City to San Miguel there are some rough places. The ford of the Salinas river should not bother any car during the rest of the summer. From San Miguel to Pismo Beach the boulevard is completed and from that point to Santa Maria and Santa Ynez the roads are good.—A. G. Waddell.
- TACOMA, WASH.** June 25—The Pacific highway route from Riverton and Renton Junction still is under repair and while open, county officials would prefer the use of the Lake route to Renton and thence back to the Pacific highway at Renton Junction. Leave Seattle, via Rainier valley for Renton. The road through the mountains of the central and northern part of California now is open and easily accessible by motor. While there is much construction work on the routes of the state highway through the Sacramento river valley and along the coast north of San Francisco, the detours are in good condition and the laterals passable. From Santa Rosa to Healdsburg the state highway is completed and the road in fine condition. North of Healdsburg the state highway, via Ukiah and Fort Bragg, varies from fair to very rough, with some stretches barely passable. On the Pacific highway the general road condition is fair with some mud in crossing the Siskiyou mountains. The road between Redding and Red Bluff now in good condition, and south of Red Bluff is the state highway, a good dirt road as far as Chico. The road between Sacramento and San Francisco is completed as far as Altamont Pass, but a detour is necessary, 7 miles west of Tracy.—F. K. Haskell.
- WENATCHEE, WASH.** June 24—From here to Seattle road alternates with gravel and dirt, but all the way the road is hard and in good condition at present.—T. M. Gibbons.
- OLYMPIA, WASH.** June 25—The Pacific highway between here and Tacoma is hard-surfaced—concrete with asphalt top. To Portland, good, with some hard-surfaced road. To Kelso, 81 miles, dirt with good gravel surface. From Kelso to Kalama and on to Vancouver, fair, considerable construction at present, but this will be completed in 30 days.—J. B. Eshom, Manager, Olympia Garage.
[Pacific Highway]



MR. AND MRS. J. W. LAWLOR, MOTOR NOMADS, AND THEIR CAMPING OUTFIT

TRUE modern gypsies are Mr. and Mrs. J. W. Lawlor, who are journeying from Tampa, Fla., to San Francisco, Cal., like veritable nomads, but instead of a rickety gypsy wagon, drawn by raw-boned horses, their conveyance is a small touring car. Except in the matter of space, their machine has been fitted up so that it is like a private car on a small scale, with comfortable sleeping accommodations and a camping outfit, complete in every detail, packed in the tonneau.

Seats Transform Into Bed

Mr. and Mrs. Lawlor are not taking the trip on a wager, nor as an advertising scheme, nor in an effort to make a record. They are taking it for pleasure alone and for that reason have no schedule, going wherever fancy leads them and remaining in one place as long as they find it agreeable, proceeding on their way when the spirit moves. They have not set a date for reaching the fair.

Their machine has been specially constructed so that the backs of the front seats let down, forming a berth more comfortable than the average sleeping car. Pillows, a felt pad and coverings are stowed away in the tonneau. When the side curtains are up, and Mrs. Lawlor has arranged tiny muslin curtains over the isinglass windows to insure greater privacy, the car affords as cozy a sleeping apartment as one could ask.

There is an oil lantern to furnish light at night and a hook conveniently placed

from which to suspend it if the occupants of the machine wish to read after they retire. The equipment carried includes a small tent, which is used as a dressing room and kitchen, and Mrs. Lawlor prepares the meals over a blue-flame oil stove. Mr. Lawlor was formerly a newspaper man and carries with him his typewriter with which to keep a record of all the interesting events of the trip. The clothing of the travelers is carried in a suitcase and an old-fashioned telescope bag, which are fastened on a trunk rack at the rear.

When the modern prairie schooner is ready to start on its way, the tonneau, level with the top of the seats, is entirely filled with the equipment, which includes in addition to the things already mentioned a folding table, kitchen uten-

sils, and other things too numerous to catalog.

The tourists left Tampa March 24 and made stops in Jacksonville, Macon, Ga.; Sumter, S. C., Richmond, Va., Washington, D. C., Baltimore, Md., Scranton, Pa., and New York City. The picture was taken during their stay in Syracuse, N. Y., which they reached during the first week in June. After leaving that city they intended to journey southwest to the Lincoln highway and follow that route to the Pacific coast. Up to the time they reached central New York their expense account for repairs amounted to \$14. Besides Mr. and Mrs. Lawlor, the only other passenger on the trip is Jax, a Boston bull, who is enjoying the trip quite as much as his master and mistress.

Answers to Inquiries for Route Information

UNIONTOWN, Pa.-Louisville, Ky.

Friendsville, Md.—Editor Motor Age—Kindly give me the best route from Uniontown, Pa., to Louisville, Ky.—Arnold E. Fox.

From Uniontown, Pa., to Wheeling, W. Va., over the National road, via Brownsville, Centerville, Beallsville, Laboratory, Washington, West Alexander, Pa., to Wheeling, W. Va. From Wheeling, W. Va., to Columbus, O., via Bridgeport, O.; Cadiz, Laceyville, Franklin, Dennison, Uhrichsville, Tuscarawas, Gnadenhutten, New Comerstown, Coshocton, Dresden, Frazesburg, Black Run, Hanover, Newark, Granville to Columbus. From Columbus to Cincinnati via Rome, Alton, West Jefferson, London, South Charleston, Cedarville, Xenia, Waynesville, Sharon,

Reading to Cincinnati. From Cincinnati, O., to Louisville, Ky., via Mack, Cleves, O.; Homestead, Ind.; Lawrenceburg, Aurora, Oberdeen, Vevay, Ind.; Carrilton, Ky.; New Castle, Eminence, Shelbyville, Simpsonville, Middletown, St. Mathews to Louisville. Running directions will be found in volumes 3 and 4 respectively of the Blue Books.

Scotia, Neb.-Cando, N. D.

Scotia, Neb.—Editor Motor Age—Kindly give me the best route from Scotia, Neb., to Cando, N. Dak.—E. B. Fish.

From Scotia, go to Grand Island, then east through Central City and Duncan to Columbus, Neb., 69 miles. At Columbus turn north on to the Meridian road and follow this highway to Grand Forks, N. D., driving

through Humphrey, Madison, Norfolk, Pierce, Yankton, 121 miles; Freeman, Bridgewater, Salem, Madison, Arlington, Watertown, 171 miles; Vernon, White Rock, Wahpeton, Christine, Hickson, Fargo, 176 miles; and Mapleton, Hillsboro, Reynolds and Merrifield, to Grand Forks, 95 miles. The Meridian road is kept in good condition by dragging.

Turn west at Grand Forks and drive 119 miles through Ojata, Larimore, McCanna, Niagara, Michigan, Lakota, Bartlett, Crary, and Devil's Lake, to Church's Ferry. Cando is a short distance north of Church's Ferry, and directions may be secured through local inquiry.

Cincinnati-Pittsburgh-Detroit

Covington, Ky.—Editor Motor Age—Kindly give me the best route from Cincinnati to Pittsburgh, thence to Detroit and return to Cincinnati.—Allen W. Goode.

Leaving Cincinnati, drive first to Zanesville, O., 153 miles, through Morrow, Wilmington, Washington Court House, Circleville, and Lancaster; thence on to Wheeling, 72 miles, via Norwich, Cambridge, Morristown and Bridgeport. Pittsburgh, 60 miles, is reached through Washington, Pa., Cannonsburg and Carnegie. Macadam and gravel roads all the way.

A brick and macadam highway extends the entire distance from Pittsburgh to Cleveland, 145 miles, and the towns en route are: Sewickley, Rochester, Beaver Falls, Darlington, Salem, Alliance, Ravenna and Bedford. From Cleveland drive east 120 miles over excellent macadam and brick through Elyria, Oberlin, Norwalk, Bellevue, Fremont and Lemoine to Toledo, O.; then via Ida, Monroe, Rockwood and Trenton to Detroit, 59 miles.

For the trip from Detroit to Cincinnati, retrace your route as far as Toledo, then drive 204 miles over good gravel or stone practically the entire distance to Cincinnati through Perrysburg, Bowling Green, Findlay, Kenton, Bellefontaine, Urbana, Springfield, Dayton, Miamisburg, and Middletown.

Milwaukee to San Francisco

Milwaukee, Wis.—Editor Motor Age—What is the total distance from Milwaukee, Wis., to San Francisco, Cal., by way of the Lincoln highway?—Irwin D. Bandow.

The total distance is approximately 2,581 miles. This mileage is made up as follows: Milwaukee to Dixon, Ill., where you pick up the Lincoln highway, 145 miles; Dixon to Omaha, Neb., 493 miles; Omaha to Salt Lake City, 1,034 miles; and Salt Lake to San Francisco, 909 miles.

Nashville, Tenn.-New York City

Nashville, Tenn.—Editor Motor Age—Kindly give me the best route from Nashville, Tenn., to New York City via Buffalo, and Albany. We had thought of going via Louisville, Cincinnati, Dayton, Cleveland, Buffalo, Albany and down the Hudson to New York. Can we go by a better way? What volumes of the Blue Book should I use?—F. A. Stewart.

You have selected an excellent itinerary for your trip. Instead of going to Cleveland from Columbus, you might route via Pittsburgh, Baltimore, and Philadelphia to New York. Either routing will have good roads.

It is 215 miles from Nashville to Louisville through Westmoreland, Scottsville, Glasgow, Cave City, Bear Wallow, Bardstown and Mt. Washington. First part of this stretch—to Gallatin—is good macadam; balance fair. From Cave City to Bear Wallow the road is now in fair shape; balance good stone.

Over good stone or gravel roads drive to Cincinnati, 136 miles, passing through Shelbyville, Newcastle, Carrollton, Aurora, Homestead, and Elizabethtown. Proceed to Columbus, O., through Sharon, Glentown, Xenia, South Charleston and London to Columbus, over excellent gravel and macadam all the way.

At Columbus, O., you have the option, as

suggested above, but we shall outline the Cleveland-Buffalo-Albany routing. Leaving Columbus, drive north through Delaware, Westfield, Galion, Mansfield, Ashland, West Salem, and Medina to Cleveland, over good roads, mostly macadam.

The balance of the trip to New York City is over good roads, mostly macadam, and from Cleveland route to Erie via Painesville, Ashtabula and Conneaut; Erie to Buffalo North East, Westfield, and Fredonia; Buffalo to New York City via Rochester, Syracuse, Utica, Albany and Poughkeepsie.

You will need Blue Books, volumes 3 and 4 for the entire trip. This also includes the alternate via Pittsburgh and Baltimore.

Stamps, Ark.-Chicago

Stamps, Ark.—Editor Motor Age—Kindly give the best route from Stamps, Ark., to Chicago, with approximate mileage. Would Motor Age advise going via Hope, Arkadelphia, Little Rock, Memphis, thence through Tennessee and Kentucky, striking East St. Louis and Bloomington?—A Reader.

Motor Age does not advise taking the route via Hope, Little Rock, etc. Better roads may be traveled by going to Texarkana, then to Anna, Tex., via New Boston, Tex., DeKalb, Oak Grove, Annona, Clarksville, Detroit, Blossom, Paris, Brookston, Petty, Honey Grove, Windom, Bonham, Ely, Whitewright, Vandalia, Anna, 172.2 miles, over natural dirt roads the entire distance.

Going north over a section of the Oklahoma, Texas & Gulf highway, having good dragged dirt roads all the way, via Van Alstyne, Howe, Sherman, Denison, Emet, Milburn, Mill Creek, West Sulphur, Davis, Wynnewood, Pauls Valley, Lexington, Noble, Norman, to Oklahoma City, Okla., 279.3 miles, then 137.4 miles via Edmond, Guthrie, Mulhall, Orlando, Perry, Bliss Station, Ponca City, Newkirk, Okla., to Arkansas City, Kan.

Continuing over the Oklahoma, Texas & Gulf highway, 97.9 miles via Douglas, Augusta, Eldorado, Burns to Florence, then 178.6 miles, via Elmdale, Cottonwood Falls, Emporia, Waverly, Williamsburg, Ottawa, Edgerton, Olathe, Overland Park, Kan., to Kansas City, Mo.

Here you have an option via Birmingham, Liberty, Excelsior Springs, Lawson, Plymouth, Utica, Chillicothe, Tindall, Spickard, Princeton, Mercer, Mo., Lineville, Ia., Allerton, Seymour, Centerville, Moravia, Blakesburg, to Ottumwa, then 126 miles via Batavia, Fairfield, Pleasant Plain, Brighton, Washington, Columbus City, Muskatine, to Davenport, Ia. Or, going to St. Joseph, via Gashland, Smithville, Edgerton, Dearborn, Halleck, 63.3 miles, then continuing 196.2 miles over the Inter-State trail via Union Star, King City, Ford City, Albany, Bethany, Eagleville, Mo., Lamoni, Ia., Leon, Osceola, Medora, Somerset, to Des Moines. From Des Moines over the Great White Way, 193.5 miles through Prairie City, Pella, Oskaloosa, Harper, Washington, Columbus Junction, Muscatine, to Davenport.

From Davenport, follow the Rock River Road through Moline, Hillsdale, Erie, Galt to Sterling. Mostly good gravel or stone all the way with the exception of the stretch between Hillsdale and Erie, a distance of about 7 miles, then via Dixon, Ashton, Rochelle, DeKalb, Geneva, West Chicago, North Glen Ellyn, Elmhurst, to Chicago, the distance between Davenport and Chicago being 172.9 miles.

Shreveport, La.-New York City

Shreveport, La.—Editor Motor Age—Kindly give me the best route from Shreveport, La., to New York City by way of Niagara Falls, N. Y., together with road conditions.—J. B. Herold.

Drive north to Hot Springs, thence via Lonesdale and Benton to Little Rock; Little Rock to Forest City via Lonoke and Brinkley; Forest City to Cape Girardeau, Mo., via Jonesboro, Piggott and Allenville; Cape Girardeau to St. Louis via Jackson, Perryville, Ste. Genevieve, Farmington and De Sota; St. Louis to Indianapolis via Collins-

ville, Vandalia, Effingham, Montrose, Terre Haute, Brazil and Bellevue; Indianapolis to Lima via Pendleton, Anderson, Muncie, Dunkirk, Portland, St. Marys and Wapakoneta; Lima to Cleveland via Ada, Upper Sandusky, Bucyrus, Galion, Mansfield, Olivesburg, Ashland, Medina and Brunswick; Cleveland to Erie via Painesville, Ashtabula and Conneaut; Erie to Niagara Falls via North East, Westfield, Fredonia and Buffalo; Niagara Falls to New York City via Rochester, Syracuse, Utica, Albany and Poughkeepsie.

This trip is over roads, composed for the most part, of gravel and macadam.

Minot, N. D.-Miami, Fla.

Portal, N. D.—Editor Motor Age—Kindly advise me the best route from Minot, N. D., to Miami, Fla. Where can I obtain detailed road guide for the territory covered by this route?—Henry W. Gill.

From Minot to Grafton. From Grafton to Fargo via Minto, Ardoch, Manville, Grand Forks, Merrifield, Reynolds, Hillsboro, Mapleton. From Fargo, N. D., to Alexandria, Minn., via Moorhead, Minn., Barnesville, Rothsays, Fergus Falls, Dalton, Evansville Garfield. From Alexandria to St. Paul, Minn., via Osakis, Sauk Center, Melrose, Albany, St. Joe, Clear Lake, Elk River, Champlin, Minneapolis. From St. Paul, Minn., to La Crosse, Wis., via Cannon Falls, Zumbrota, Rochester, Lewiston, Winona, La Crescent, Minn. From La Crosse to Madison, Wis.—slippery in wet weather—via St. Joseph, Cashton, Ontario, Kendalls, Reedsburg, Abelmans, Baraboo, Prairie du Sac, Springfield Corners. From Madison, Wis., to Chicago via McFarland, Stoughton, Janesville, Walworth, Wis., Harvard, Ill., Woodstock, Algonquin, Maywood. From Chicago, Ill., to Fort Wayne, Ind.—good in dry weather—via South Chicago, Ill., Hammond, Ind., Highlands, Hobart, Valparaiso, Donaldson, Plymouth, Warsaw, Columbia City. From Fort Wayne, Ind., to Lima, O.—over a section of the Lincoln highway—via New Haven, Ind., Van Wert, O., Delphos. From Lima to Canton, O., via Ada, Upper Sandusky, Bucyrus, Galion, Mansfield, Olivesburg, Ashland, Wooster, Massillon. From Canton, O., to Pittsburgh, Pa., via Louisville, Harrisburg and Alliance. From Pittsburgh to Bedford, Pa., via Wilkinsburg, Greensburg, Ligonier and Wolfburg. From Bedford, Pa., to Hagerstown, Md., via Everett, McConnellsburg, Mercersburg and Greencastle. From Hagerstown, Md., to Staunton, Va., via Williamsport, Md., Martinsburg, W. Va., Bunker Hill, W. Va., Winchester, Va., Stephens City, Middletown, Mount Jackson, Harrisonburg, Mount Sidney to Staunton. From Staunton to Roanoke, Va., via Greenville, Midway, Fairfield, Lexington, Natural Bridge, Buchanan, Cloverdale to Roanoke. From Roanoke, Va., to Winston-Salem, N. C., via Rocky Mount, Sydnersville, Oak Level, Martinsville, Ridgeway, Va., Stoneville, N. C., Ellisboro, Kernersville. From Winston-Salem to Lexington, N. C., via Midway, and Brinkleys. From Lexington to Charlotte via Salisbury, Landis, Concord and Newell. From Charlotte, N. C., to Greenville, S. C., via Sloane's Ferry, Belmont, Gastonia, Bessemer City, Grover, N. C., Blacksburg, S. C., Gaffney, Converse, Spartanburg, and Greer. From Greenville, S. C., to Atlanta, Ga., via Oak Grove, Anderson, Fair Play, S. C., Lavonia, Ga., Franklin Springs, Pocatigo, Lawrenceville and Decatur. From Atlanta to Macon, Ga., via Jonesboro, Pomona, Barnesville and Lorane. From Macon to Valdosta, Ga., via Vienna, Sycamore, Lenox, Hahira and Mineola. From Valdosta, Ga., to Jacksonville, Fla., via Ellaville, Fla., Falmouth, Live Oak, Oluster, McClenny to Jacksonville. From Jacksonville to Rockledge, Fla., via St. Augustine, Ormond, Sea Breeze, Daytona, and New Smyrna. From Rockledge to Palm Beach via Melbourne, Quay, Fort Pierce, to Palm

Beach. From Palm Beach to Miami, Fla., via West Palm Beach.

Running directions will be found in volumes 5, 4 and 3 respectively.

Lima, O.—New York City

Wheeling, W. Va.—Editor Motor Age—I am planning to take a motor tour this summer, and desire a route touching the following points: Starting at Lima, O., and going via Cleveland, Niagara Falls, Boston, New York, Philadelphia, Baltimore, Washington, and back to Lima, O., by way of Pittsburgh. What is the distance covered? The conditions of the roads, and leading points of interest? Would appreciate a few suggestions on lessening expense. Give the safest and best route.—C. W. Wagner.

Lima to Cleveland via Ada, Upper Sandusky, Bucyrus, Gallon, Mansfield, Olivesburg, Ashland, Medina and Brunswick; Cleveland to Niagara Falls via Painesville, Conneaut, Erie, North East, Fredonia and Buffalo; Niagara Falls to Albany via Rochester, Syracuse and Utica; Albany to Williamstown via Troy, Grafton, Petersburg and Pownal; Williamstown to Greenfield, over the Mohawk trail, via North Adams and Shelburne Falls; Greenfield to Boston via Gardner, Fitchburg, Concord, Lexington and Cambridge; Boston to New York City via Worcester, Springfield, Windsor Locks, Hartford, Waterbury and Danbury; New York City to Washington via Trenton, Philadelphia and Baltimore; Washington to Pittsburgh via Frederick, Hagerstown, Bedford and Ligonier; Pittsburgh to Lima via Salem, Alliance, Canton, Wooster, Bucyrus and Upper Sandusky. This trip will cover about 2,000 miles over good macadam roads almost all the way with the exception of some few stretches of gravel, brick and dirt.

The principal points of interest along this route can be found in volumes 3 and 4 of the Blue Book for 1915.

Rockford, Ill.—Buffalo, N. Y.

Durand, Ill.—Editor Motor Age—Kindly give me the best route from Rockford, Ill., to Buffalo, N. Y., via Cleveland, O., also a return trip by a different way. What are the distances and road conditions?—Edward Nelson.

Rockford to Chicago via Belvidere and Garden Prairie, 87.1 miles; Chicago to South Bend via Hammond and Valparaiso, 100.7 miles; South Bend to Toledo via Goshen, Kendallville, Bryan and Wauseon, 162.6 miles; Toledo to Cleveland via Fremont, Belleville and Oberlin, 120.1 miles; Cleveland to Erie via Painesville, Ashtabula and Conneaut, 102 miles; Erie to Buffalo via North East, Westfield and Fredonia, 89.2 miles; Buffalo to Niagara Falls, 26.4 miles; Niagara Falls to Hamilton, Ont., via Homer, St. Catharines and Beamsville, 49.3 miles; Hamilton to London via Ancaster, Brantford, Cathcart, Woodstock and Thamesford, 77.7 miles; London to Detroit via Lambeth, Melbourne, Highgate, Cedar Springs, Ruthven, Olinda and Windsor, 140.8 miles; Detroit to Kalamazoo via Wayne, Ypsilanti, Ann Arbor, Jackson, Marshall, Battle Creek and Galesburg, 139.5 miles; Kalamazoo to St. Joseph via Benton Harbor, Watervliet and Paw Paw, 52.1 miles; St. Joseph to South Bend via Berrien Springs and Niles, 34.4 miles; South Bend to Chicago via New Carlisle, Michigan City and Crisman, 101.9 miles; Chicago to Rockford via Elgin and Genoa, 86.3 miles. This trip is over good roads all the way, being mostly gravel and macadam.

Pueblo, Colo.—Erie, Pa.

Pueblo, Colo.—Editor Motor Age—I am contemplating a motor trip from Pueblo, Colo., to Erie, Pa., and Niagara Falls. Kindly give me a southern route going by way of Kansas City, and returning by way of Chicago and Sioux City.—F. D. Tripp.

Pueblo to Kansas City via La Junta, Syracuse, Dodge City, Lyons, McPherson and Osage City; Kansas City to St. Louis via

Marshall and Columbia; St. Louis to Indianapolis via Collinsville, Vandalia, Effingham, Montrose, Terre Haute, Brazil and Belleville; Indianapolis to Lima via Pendleton, Anderson, Muncie, Dunkirk, Portland, St. Mary's and Wapakoneta; Lima to Cleveland via Ada, Upper Sandusky, Bucyrus, Gallon, Mansfield, Olivesburg, Ashland, Medina and Brunswick; Cleveland to Erie via Painesville, Ashtabula and Conneaut; Erie to Niagara Falls via North East, Westfield, Fredonia and Buffalo. Return on same route to Cleveland, thence to Toledo via Elyria, Oberlin, Norwalk, Bellevue, Fremont and Woodville; Toledo to South Bend via Wauseon, Bryan, Kendallville, Wawaka, Ligonier and Goshen; South Bend to Chicago via New Carlisle, LaPorte, Valparaiso, Hobart, Highlands, Hammond and South Chicago; Chicago to Dubuque via Elgin, Genoa, Rockford, Freeport, Warren and E. Dubuque; Dubuque to Waterloo via Dyersville and Manchester; Waterloo to Ft. Dodge via Cedar Falls, Ackley, Iowa Falls and Webster City; Ft. Dodge to Sioux City via Manson, Storm Lake, Cherokee and LeMars; Sioux City to Fremont via Dakota, Homer, Oakland and Hooper; Fremont to Grand Island via Schuyler, Columbus and Central City; Grand Island to North Platte via Alda, Kearney and Lexington; North Platte to Ft. Morgan via Big Springs, Julesburg and Sterling; Ft. Morgan to Denver via Weldon, Greeley and Brighton; Denver to Pueblo via Sedalia, Colorado Springs and Fountain.

Normal, Ill.—San Francisco

Normal, Ill.—Editor Motor Age—Myself and family expect to start some time in July for California and intend to camp en route. Which route does Motor Age consider the best and the least desert. Would like to hear from any family that has made the trip to the coast in this manner.—J. E. Hatfield.

Drive down to Bloomington, thence to Peoria via Mackinaw; Peoria to Galesburg via Kickapoo, Brimfield and Knoxville; Galesburg to Davenport via Henderson and Rock Island; Davenport to Des Moines via Muscatine, Fredonia, Washington, Springfield and Oskaloosa; Des Moines to Omaha via Van Meter, Adair, Atlantic and Council Bluffs; Omaha to Grand Island via Fremont, Schuyler, Columbus and Central City; Grand Island to North Platte via Kearney and Lexington; North Platte to Cheyenne via Ogalla, Big Springs, Chappell, Sidney and Kimball; Cheyenne to Salt Lake City via Laramie, Medicine Bow, Rawlins, Rock Springs, Granger, Evanston and Coalville; Salt Lake City to Montello, Nev., via Ogden, Snowville and Cobre; Montello to Reno via Elko, Winnemucca, Lovelock and Wadsworth; Reno to San Francisco via Carson City, Placerville and Sacramento.

Port Arthur, Tex.—San Francisco

Port Arthur, Tex.—Editor Motor Age—I am completing arrangements for making a trip from Port Arthur, Tex., to San Francisco, Cal., to take in the fair and tour California in general, about the middle of August. Kindly advise where I may secure maps, etc., covering the most comfortable, convenient and best road route for going and returning on this trip.—F. C. Flanagan.

Volumes 5 and 6 of the Blue Book for 1915, published by the Blue Book Publishing Co., 910 South Michigan avenue, Chicago, price \$2.50 per volume, will give you complete running directions, together with maps for your trip from Port Arthur, Tex., to San Francisco, Cal.

The trip we would recommend about the middle of August would be from Port Arthur to Houston to Dallas. From Dallas to Wichita, thence to Great Bend, Pueblo and Colorado Springs. From this latter place you have the option of going either to Denver or continuing on through Buena Vista and Glenwood Springs to Salt Lake City. From

Salt Lake City to San Francisco, over the Overland trail, via Ogden, Montello, Winnemucca, Reno and Sacramento. Volume 6 of the Blue Book gives detailed running directions for tours in California.

If you are leaving the coast about the last of September or first of October, we would suggest returning via the Needles highway, visiting the Grand Canyon, Petrified Forest, and other extremely interesting places.

Metropolis, Ill.—Vero, Fla.

Metropolis, Ill.—Editor Motor Age—Kindly give me the best route from Metropolis, Ill., to Vero, Fla. Desire to go by way of Chattanooga. Also state the distances between the main cities, also give road conditions.—F. W. Rodenberg.

Metropolis to Paducah via Brookport, 10.2 miles; Paducah to Nashville via Hopkinsville, Charlesville and Springfield, 168.2 miles; Nashville to Chattanooga via Murfreesboro, Manchester and Jasper, 143.1 miles; Chattanooga to Atlanta via Dalton and Cartersville, 127.3 miles; Atlanta to Macon via Jonesboro, Griffin and Forsyth, 96.7 miles; Macon to Valdosta via Vienna, Tifton and Mineola, 149.5 miles; Valdosta to Jacksonville via Madison, Live Oak, Wellborn and McClenny, 142.1 miles; Jacksonville to Ormond via St. Augustine, 88.8 miles; Ormond to Rockledge via Daytona, 74.5 miles; Rockledge to Quay via Melbourne and Sebastian, 54.5 miles; Quay to Vero, about 10 miles.

Forest, O.—Jacksonville, Fla.

Forest, O.—Editor Motor Age—Kindly give me the best route from Forest, O., to Jacksonville, Fla.—John N. Pfeiffer.

From Forest to Canton, O., via Upper Sandusky, Bucyrus, Mansfield, Ashland, Wooster and Massillon. From Canton to Wheeling, W. Va., via Navarre, Justus, Canal Dover, New Philadelphia, Dennison, Cadiz, Bridgeport, O., then over the National road from Wheeling, W. Va., to Uniontown, Pa., via West Alexander, Pa., Washington, Centerville and Brownsville. From Uniontown, Pa., to Cumberland, Md., via Somersfield, Addison, Pa., Keyser's Ridge, Md., and Frostburg. From Cumberland to Hagerstown, Md., via Piney Grove, Hancock, Clear Spring. From Hagerstown, Md., to Staunton, Va., via Williamsport, Md., Martinsburg, W. Va., Bunker Hill, W. Va., Winchester, Va., Stephens City, Middletown, Mount Jackson, Harrisonburg, Mount Sidney. From Staunton to Roanoke, Va., via Greenville, Midway, Fairfield, Lexington, Natural Bridge, Buchanan, Cloverdale. From Roanoke, Va., to Winston-Salem, N. C., via Rocky Mount, Sydnersville, Oak Level, Martinsville, Ridgeway, Va., Stoneville, N. C., Ellisboro, Kernersville. From Winston-Salem to Lexington, N. C., via Midway and Brinkleys. From Lexington to Charlotte via Salisbury, Landis, Concord and Newell. From Charlotte, N. C., to Greenville, S. C., via Sloane's Ferry, Belmont, Gastonia, Bessemer City, Grover, N. C., Blacksburg, S. C., Gaffney, Converse, Spartanburg, and Greer. From Greenville, S. C., to Atlanta, Ga., via Oak Grove, Anderson, Fair Play, S. C., Lavonia, Ga., Franklin Springs, Pocatigo, Lawrenceville and Decatur. From Atlanta to Macon, Ga., via Jonesboro, Pomona, Barnesville and Lorane. From Macon to Valdosta, Ga., via Vienna, Sycamore, Lenox, Hahira and Mineola. From Valdosta, Ga., to Jacksonville, Fla., via Ellaville, Fla., Falmouth, Live Oak, Oluster, McClenny.

Running directions in volumes 4 and 3 respectively of the Blue Book.

Mangum, Okla.—San Francisco

Mangum, Okla.—Editor Motor Age—Kindly give me the best route from Mangum, Okla., to San Francisco, Cal.—Marshall Ferguson.

From Mangum go to Amarillo, thence to Clayton, N. M., via Dalhart; Clayton to Colorado Springs via Raton, Trinidad, Walsenburg and Pueblo; Colorado Springs to

Buena Vista via Manitou, Crystola, Florissant and Newett; Buena Vista to Salt Lake City via Leadville, Wolcott, Glenwood Springs, Meeker, Vernal, Duchesne, Heber and Park City; Salt Lake City to Elko, Nev., via Ogden, Brigham, Snowville, Montello and Cobre; Elko to Reno via Winnemucca, Lovelock and Wadsworth; Reno to San Francisco via Carson City, Placerville and Sacramento.

Dyersburg, Tenn.-Knoxville, Tenn.

Caruthersville, Mo.—Editor Motor Age—Kindly give me the best route from Dyersburg, Tenn., to Memphis, then to Nashville and Knoxville, Tenn. Also the best route from Nashville, Tenn., to Cerulean Springs, Ky. What are the road conditions?—Tom M. Smith.

Dyersburg, south through Ripley, Covington to Memphis. Motor Age is unable to give the number of miles or the road conditions along this route.

The accepted route from Memphis to Nashville is through Dyersburg to Fulton, Ky., Murray, Ky., crossing Tennessee river at Agner's ferry and Cumberland river 9 miles farther on at Canton, to Hopkinsville, Ky., and then south through Clarksville, Tenn., to Nashville. All of this route is negotiable—good ferries on the rivers, and bridges over the other streams, much of the road is gravel and macadam and throughout western Tennessee fairly good dirt roads will be found in most cases.

Or, you may go via Germantown, Collier-ville, Moscow, LaGrange, Grand Junction, Saulsbury, Essary Springs, Tenn., Corinth, Miss., Burnsville, Iuka, Miss., Cherokee, Ala., Barton, to Tusculumbia, Ala., 159.5 miles, then 121.9 miles, northeast through Sheffield, Florence, St. Florian, Green Hill, Ala., Loretto, Tenn., Pleasant Point, Dunn, Lawrenceburg, Crestview, Williamsville, Sandy Hook, Ridley, Columbia, Brentwood, to Nashville. It is suggested that you make local inquiry along this route as Motor Age can give no definite information as to the condition of the roads.

It is 143.1 miles to Chattanooga, via Murfreesboro, Manchester, Hillsboro, Pelham, Monteagle, Tracy City, Sequatchie, Jasper, crossing the Tennessee river at Rankins Ferry into Chattanooga.

Over good road balance of way, Knoxville, 119 miles, is reached via Oltewah, Charleston, Athens, Sweetwater, Loudon, Lenoir City and Concord, or a shorter route is from Nashville, south to Murfreesboro, then east through Smithville, Sparta, Crossville, Rockwood.

From Nashville, Tenn., to Cerulean Springs, Ky., is approximately 105 miles, and it is reached through Springfield, Cedar Hill, Adams, Port Royal, Clarksville, Ringgold, Tenn., Hopkinsville, Ky., Gracey. Good macadam roads half way to Springfield; poor road from there to Clarksville; fine macadam to Hopkinsville, from there on a mixture of poor gravel or clay.

Danville, Ind.-Battle Lake, Minn.

Danville, Ind.—Editor Motor Age—Kindly give the best route from Danville, Ind., to Battle Lake, Minn.—L. W. Armstrong.

Drive to Indianapolis, then northwest through Lebanon, Antioch, Frankfort, Mulberry, to LaFayette, 66.1 miles over excellent gravel all the way. Leaving LaFayette, passing Montmorenci, Wolcott, Remington, Rensselaer, Thayer, Highlands, Hammond, Ind., South Chicago, Ill., 131.3 miles, to Chicago.

From Chicago, 152 miles, through Oak Park, Maywood, Algonquin, Crystal Lake, Ridgefield, Woodstock, Harvard, Ill., Walworth, Wis., Fairfield, Janesville, Edgerton, Stoughton, Lake Waubesa, to Madison, Wis.

Continuing along this road 145.6 miles, passing through Pleasant Branch, Sauk City, Baraboo, Abelmans, Reedsburg, Wonewoc, Union Center, Kendalls, Ontario, Cashton,

Portland, LaCrosse. Leaving LaCrosse, route immediately crosses the Mississippi River, then through LaCrescent, Miss., Ridgeway, Witoka, Winona, Lewiston, Utica, St. Charles, Chester, Rochester, Pine Island, Zumbrota, Hader, Cannon Falls, Rich Valley, to St. Paul, Minn., 162.1 miles, then follow the University Avenue route to Minneapolis, Minn.

Leaving Minneapolis, 196.4 miles to Fergus Falls, passing Champlin, Elk River, St. Cloud, St. Joe, Avon, Albany, Freeport, Melrose, Sauk Center, Osakis, Alexandria, Garfield, Brandon, Ashby. This is part of the Northwest trail.

At Fergus Falls, go east through Wall Lake, Underwood to Battle Lake.

Joliet, Ill.-Detroit, Mich.

LaSalle, Ill.—Editor Motor Age—Kindly give the best route from Chicago and Joliet, Ill., to Toledo, O., and Detroit, Mich. Also give an option so we may go by one route and return by another.—F. B. Elliott.

The best connection between Joliet and Chicago is via New Lenox, Frankfort, Homewood, Blue Island, 49.2 miles over pavement and good gravel.

Between Chicago and South Bend, Ind., there is an option, going via South Chicago, Ill., Hammond, Ind., Highlands, South Gary, Hobart, Valparaiso, Westville, Laporte, Crumstown, or a better route, although longer, is via Roseland, Kensington, Station, Riverdale, Oak Glen, Lansing, Ill., Highlands, Ind., Schererville, Merrillville to Valparaiso. Here take up the preceding route to South Bend.

It is 162.6 miles between South Bend, Ind., and Toledo, O., going via Mishawaka, Osceola, Goshen, Ligonier, Wawaka, Brimfield, Kendallville, Butler, Ind., Edgerton, O., Bryan, Archbold, Wauseon, Crissey. Leaving Toledo, go through Ida Station, Monroe, Rockwood, Sibley, 59.3 miles, to Detroit.

On your return trip you have an option between Detroit and South Bend, going via Wayne, Ypsilanti, Ann Arbor, Jackson, Parma, Albion, Marshall, Battle Creek, Augusta, Galesburg, Kalamazoo, Paw Paw, Dowagiac, Pokagon, Summerville, Niles, Mich., or a shorter route through Ypsilanti, Clinton, Somers, Moscow, Coldwater, Kinderhook, Mich., Orland, Ind., Howe, Shipshewana, Elkhart, Osceola, Mishawaka.

Between South Bend and Chicago you may return via the northern route, passing through New Carlisle, Rolling Prairie, Michigan City, Porter, Crisman, Hobart.

Salina, Kan.-Chicago, Ill.

Salina, Kan.—Editor Motor Age—Kindly advise the best route from Salina, Kan., to Chicago, by way of Galesburg, Ill.—Watson, Durand-Kasper Gro. Co.

From Salina drive to Topeka, Kan., 129 miles, through Abilene, Junction City, Ogden, Manhattan and St. Marys, to Topeka; then to Kansas City, 76 miles, via Lawrence, Eudora, De Soto, Zarah and Shawnee.

From Kansas City drive over the Chicago, Kansas City and Gulf highway to Ottumwa, 246 miles, through Excelsior Springs, Cowgill, Plymouth, Chillicothe, Galt, Lucerne, Seymour and Udell to Ottumwa, and 78 miles through Batavia, Rome and Mt. Pleasant to Burlington, Ia.

It is a run of 50 miles to Galesburg, Ill., passing through Owauwka and Monmouth; and 184 miles to Chicago via Galva, Kewanee, Wyanet, Princeton, Mendota, Somonauk, Plano, Montgomery and Naperville. Covered by volume 5 of the Blue Book.

Wichita Falls, Tex.-Springfield, Mo.

Electra, Tex.—Editor Motor Age—Kindly give me the best route from Wichita Falls, Tex., to Springfield, Mo.—Martin L. Taylor.

From Wichita Falls, Tex., drive north as far as Newton, Kan., passing through Randlett, Lawton, Apache, Chickasha, El Reno, Kingfisher, Hennessy, Enid, Jefferson, Wel-

lington and Wichita, to Newton. Distance, 386 miles.

Go to Kansas City, 213 miles, by way of Peabody, Florence, Cottonwood Falls, Emporia, Waverly, Ottawa and Olathe. At Kansas City turn south and drive 161 miles through Peculiar, Harrisonville, Butler, Arthur, Nevada and Jasper to Carthage; thence through Aurora to Springfield, Mo.

Grand Junction, Colo.-Yellowstone Park.

Grand Junction, Colo.—Editor Motor Age—Kindly give me information regarding the privileges and restrictions of touring in the Yellowstone National Park, also the best route from Grand Junction, Colo. Is the road from Idaho Springs to the park passable?—F. S. Carman.

Leaving Grand Junction drive 308 miles to Salt Lake City, through Mack, Cisco, Green River, Price, Colton, Spanish Fork, Pleasant Grove and American Fork to Salt Lake City. Between Mack and Price, Utah, most of the route is across the desert, and careful driving is necessary. You should be amply prepared for carrying water and food.

Over a good road all the way drive from Salt Lake City to Ogden, 37 miles; then to Pocatello, Id., 137 miles, passing Bear River City, Malad and McCammon; and 97 miles to St. Anthony, through Firth, Idaho Falls, Rigby and Rexburg; to Yellowstone Park, 87 miles, via Ashton and Uden's Elk Ranch to entrance of park.

The regulations pertaining to motor cars in Yellowstone Park have not yet been given out. It is the intention, however, to permit the cars to enter on one side of the park and leave by a different road if so desired. The cars to leave a half hour in advance of the first coach, and the traffic will go in one direction. The park will not be opened until August 1.

Complete running directions will be found in volume 5 of the Blue Book, published by the Blue Book Publishing Co., Chicago. Price, \$2.50.

Tulsa, Okla.-Colorado Springs, Colo.

Haskell, Okla.—Editor Motor Age—Kindly publish the best route from Tulsa, Okla., to Colorado Springs, giving the mileage and road conditions.—Charles B. Wickham.

Drive to Oklahoma City, then turn north for Arkansas City, 137 miles, which is reached through Guthrie, Orlando, Perry, Ponca City and Newkirk, and then on to Wichita, Kan., 63 miles, via Winfield, Udall and Mulvane.

Leaving Wichita, Kan., drive north 25 miles to Newton, where you should turn west and go 518 miles to Colorado Springs, Colo., via Burrton, Hutchinson, Sterling, Great Bend, Kinsley, Dodge City, Garden City, Syracuse, Holly, Lamar, Las Animas, La Junta, Rocky Ford and Avondale to Pueblo, and Fountain to Colorado Springs. Good roads the entire distance.

Complete running directions will be found in volume 5 of the Blue Book.

Cambridge, Neb.-Tampa, Fla.

Cambridge, Neb.—Editor Motor Age—Will you kindly give me the best route from Cambridge, Neb., to Tampa?—F. Buising.

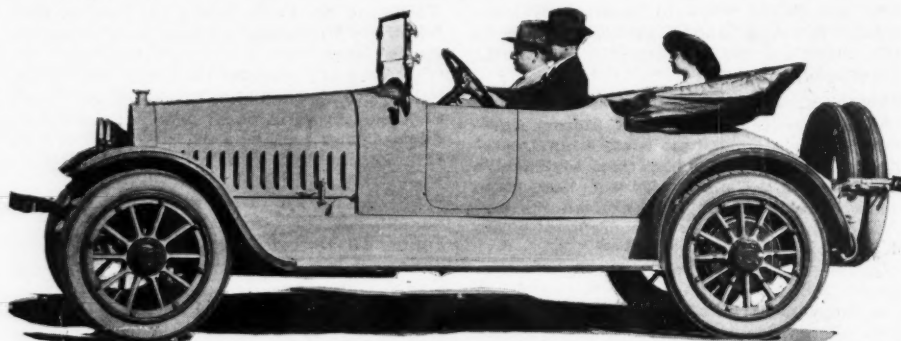
Cambridge to Omaha via McCook, Hastings and Lincoln; Omaha to Chicago via Des Moines and Davenport; Chicago to Fort Wayne via Valparaiso, Plymouth and Warsaw; Ft. Wayne to Wheeling, W. Va., via Lima, Marion and Coshocton; Wheeling to Washington, D. C., via Uniontown, Cumberland, Hagerstown and Frederick; Washington to Richmond via Fredericksburg, Spotsylvania C. H., Partlow and Coatesville; Richmond to Raleigh via Petersburg; Raleigh to Augusta, Ga., via Pinehurst, Cheraw, Camden and Columbia; Augusta to Jacksonville, Fla., via Savannah and Brunswick; Jacksonville to Tampa via St. Augustine, Ormond, Daytona, Deland, Orlando, Kissimmee, Bartow, Lakeland and Plant City.

New Body and Improved Oiling System in 1916 Marmon

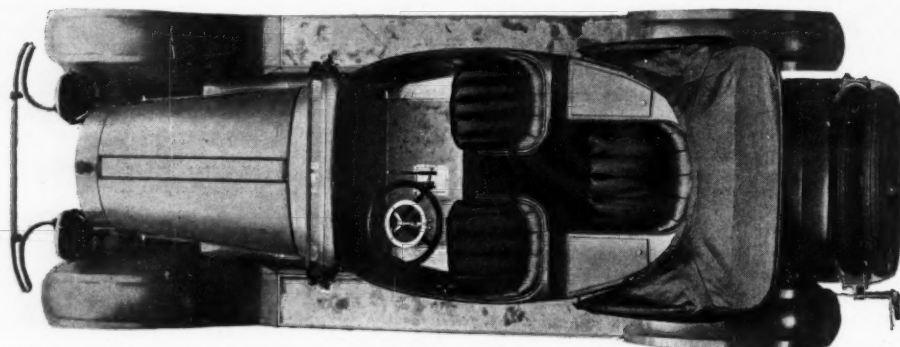
General Features Unaltered for Coming Season

FEATURES OF THE NEW MARMON LINE

Single six-cylinder chassis
Oil feed varies with throttle opening
Newly-designed body styles
Novel three-passenger roadster
General chassis design unaltered
Bosch cranking and lighting
Price \$3,350 for seven-passenger



MARMON NEW TYPE OF THREE-PASSENGER CLOVER-LEAF ROADSTER. TOOL BOXES ARE LOCATED ON EITHER SIDE OF THE THIRD SEAT



TOP VIEW OF THE CLOVER-LEAF MARMON ROADSTER SHOWING THE COMPARTMENTS NEXT THE REAR SEAT

AS announced previously in the news columns of Motor Age, the 1916 Marmon, made by the Nordyke & Marmon Co., Indianapolis, Ind., differs but little from the 1915 model, the two main changes being an improved lubrication system and a new style of body. The chassis produced by the Marmon company always have been original in design and this present car, known as the model 41, is no exception to the rule.

The motor is a six 4.25 by 5.5 with 469 cubic inches displacement and the gearset is a separate unit. There is a great deal of highly special detail about both the motor and the rest of the chassis, but before turning to this mention should be made of the new bodies on the 132½-inch wheelbase.

Detail Body Refinements

The seven-passenger touring body, at \$3,350, is one of the favorite styles on so large a chassis and this has been improved by small changes in line and by a minute care for detail. For example, the upholstery now terminates flush with the tip edges of the panels, so that it is not seen when regarding the car from the outside, the back curtain of the top is drawn down to an internal fixing which conceals all beads or fasteners and there are no external handles or projections of any sort. The Marmon engineers first have laid out a large and comfortable seating scheme and then built round it the smoothest and

neatest inclosure possible, which means that the streamline effect has not been obtained by any sacrifice of inside accommodation.

New Clover-Leaf Roadster

In addition to the seven-passenger style, similar bodies for four and for five passengers are made and there are also speedster and roadster patterns, all at \$3,250. For the latter there is one of the new clover-leaf bodies with three seat, the middle one being somewhat back of the other two. On either side of this third seat like arms to a chair are two large kit boxes for tools, spares or small baggage and the outer shell has the same distinctive lines which typify the touring bodies. This type of body is not in itself a novelty, but the Marmon design seems to make the very best of the great possibilities of the clover-leaf type of construction.

The novelty in the motor is that the pressure of the force-feed oil is varied in proportion to the throttle opening on the carburetor so that the supply shall be in proportion to the work which the motor is doing at the moment. When the throttle is wide open the bearing pressures are high and in this condition there is no restriction on the oil supply. When, however, the motor is running easily on half throttle or less the oil supply is cut down so that overfeeding leading to waste of oil and possible smoking is prevented.

The sectional photograph of the motor shows all the oiling system. At the bottom of the crankcase and in the middle, is the oil pump and this has a little throttle connected by a simple, straight rod to the carburetor.

Bearings Fed Under Pressure

Oil is forced to each of the seven crankshaft bearings and so gains entry to the hollow crankshaft whence it is conducted to the connecting rod bearings, the piston pins and the cylinders. In addition, the camshaft, with its eight bearings, is separately inclosed in an aluminum tunnel, which is kept filled with oil under pump pressure and a tiny hole is drilled through each tappet rod. This allows the oil to escape over the head of the tappet immediately beneath the end of the valve stem, so lubricating every part of the valve gear. Also, it is to be imagined, the presence of oil at this point quiets the valve action.

This is no new feature for the Marmon, having been used by the makers for many years, but it is not always that things of this kind are remembered as they should be. It necessitates a tight valve enclosing plate, of course, but there is a large return passage for the oil which lies around the tappets after doing its work, so the cover plates can be removed without any lubricant loss.

Another somewhat unusual feature is the use of both gear and chain front end drives, the camshaft being driven by a spur gear and the pump or magneto shaft by means of a pair of short chains which run over an intermediate idler for adjusting purposes.

Clutch Design Unaltered

Last year the Marmon company introduced a new clutch with the peculiarity that the cushion springs were located in the flywheel instead of beneath the asbestos cone facing. This feature is continued, but it might be well to point out the fundamental advantage. Woven asbestos and wire fabric is heavier than leather and also stiffer, so, to prevent the

centrifugal force causing it to lift from the cone, it is well to secure it as tightly as may be with many rivets. If the clutch cone and facing are thus made as much like one piece as they can be, the facing cannot fly out and drag on the flywheel when the clutch is withdrawn. Also, it is easy to fit to the flywheel large area contact springs which give an easier engagement that might be obtained readily from smaller ones beneath the facing material.

Three-Point Separate Gearset

Like the motor, the separate gearset is attached at three points, two at the rear and one in front. Between gearbox and motor is a universal coupling that allows for any small misalignment that may arise through frame weave and the splined shaft that carries the sliding gears is very large and stiff. Very particular care is taken in supporting the gearshift lever, a long bearing on either end of the cross shaft insuring that the lever shall always move across the quadrant without the least hint of sticking.

Spiral-Bevel Drive

Drive from the spiral-bevel axle is taken through the springs, but the torque is absorbed by a substantial pressed steel member. The intermediate brake gear is carried on a cross rail of the frame located at the place where the front end rear spring hangers are attached, this serving greatly to strengthen the rigidity of the drive.

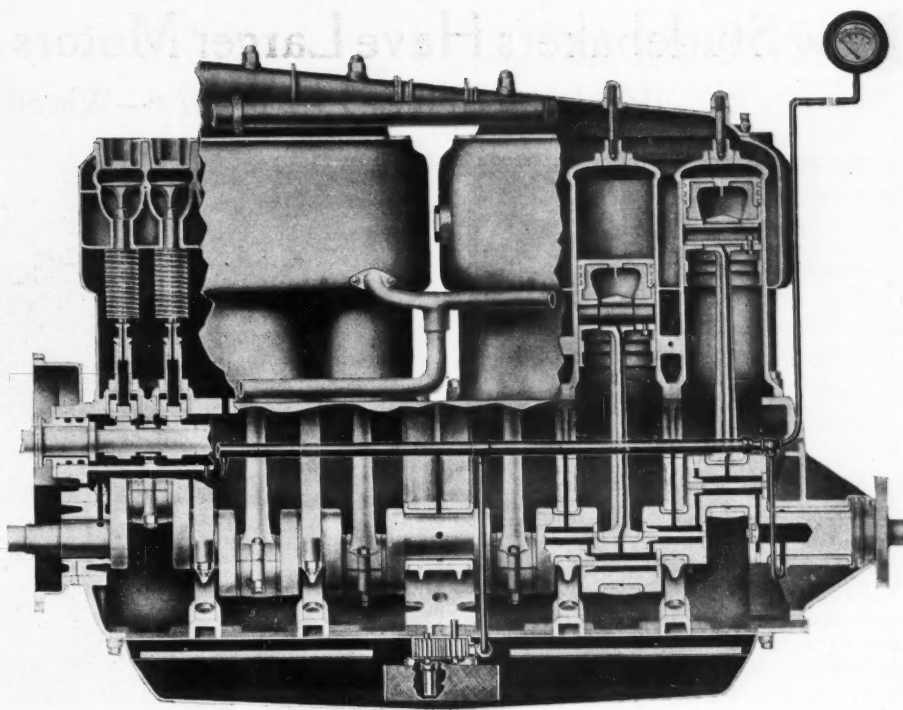
Lozier Back With a Twelve-Cylinder

DETROIT, June 26—According to preliminary information given out today, Harry A. Lozier's new car is to be a twelve-cylinder machine, selling at \$1,750, either as a two- or seven-passenger. The named selected temporarily is the H. A. L., and this may, or may not, be adopted permanently. Details as to the personnel of the company, which has been organized by Mr. Lozier to market the new twelve in Cleveland, are still withheld, but are to be made public soon.

Motor Has Overhead Valves

The motor to be used is a 3 by 4½ inches, giving it a rating of 43.2 horsepower, according to the S. A. E. formula, and a piston displacement of 381.6 cubic inches. The complete weight of the car with tanks filled, spare tire and equipment is said to be about 3,300 pounds.

The motor is a Cleveland product and of a design that has previously been brought out in types of a fewer number of cylinders. The cylinders are arranged in the familiar V fashion and at 60 degrees, with all six of one side cast in a block. The valves are overhead and seated in the removable head, which comes off as a unit for each block. The valve rods run up to the rockers in the V, which, due to the overhead valve construction, permit of the exhaust manifolds



SIX-CYLINDER MARMON MOTOR, SHOWING THE PASSAGES FOR OIL, WHICH IS FED UNDER PRESSURE TO THE BEARINGS

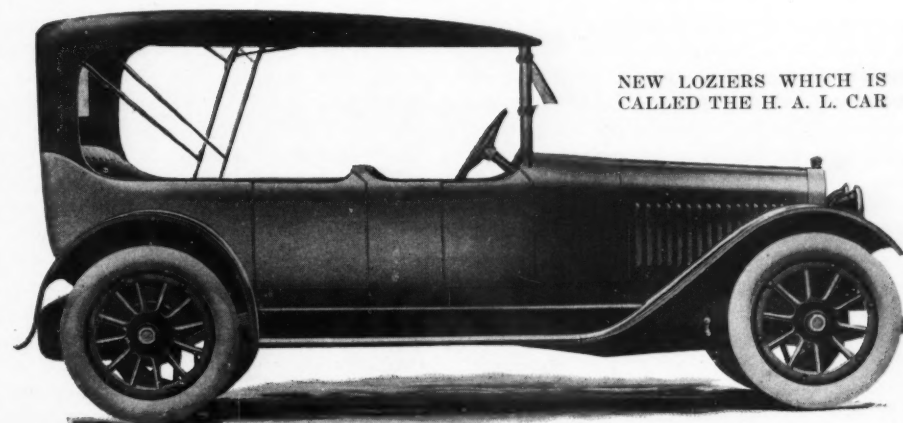
Dimensions of the motor remain as last year and the wheelbase is still 132.5 inch. As before, the starting and lighting system is all Bosch with a Willard storage battery, and a Bosch magneto is used for ignition. Tires are Goodrich Silvertown 36 by 4.

on the crank, a form of construction used in several prominent multi-cylinder engines. The crankshaft has three bearings, and there is a single camshaft in the center with a separate cam for each valve, making twenty-four in all. The camshaft is driven by silent chain from the crankshaft. Pistons are very light and made of a special aluminum alloy.

Lubrication by a New System

The lubrication system, full details of which are not yet disclosed, is said to be of a type never before seen on any stock car, though it has been thoroughly tried out.

Details of the chassis are meagre at this time, although it is definitely stated that a dry-disk clutch is used, and that the wheelbase is 130 inches. Left drive center control of a three-speed gearset, and 34 by 4 tires are to be used. In the spring suspension the cantilever construction is employed at the rear, with the front springs half-elliptic.



NEW LOZIER'S WHICH IS CALLED THE H. A. L. CAR

New Studebakers Have Larger Motors and Refined Chassis

Bore Increased from 3 1-2 to 3 7-8—Wheelbase Lengthened

STUDEBAKER CHANGES BRIEFLY STATED

*Prices reduced on all models
Six is 1 inch longer; four 4 inches
Cross shaft on motor removed
New manifolding, no cored passages
Motor accessories in new places
Stiffer rods; longer pistons*

GREATER standardization of the parts entering into its two chassis—a four- and a six-cylinder type—and further attention to production make it possible for the Studebaker Corp. to bring out its new models in large and more powerful form at reduced prices over those of the previous models.

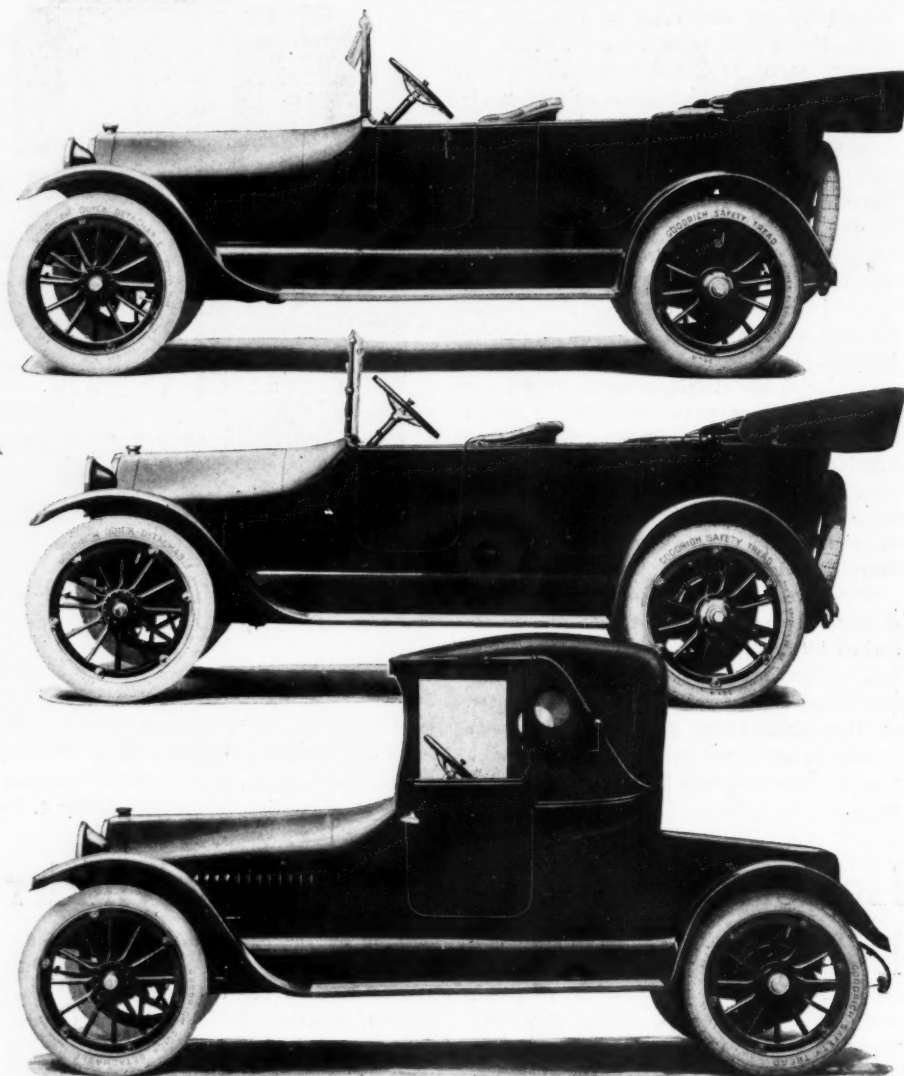
The price cut is more emphasized in the six, which is to sell at \$1,050 as a seven-passenger touring model, and \$1,000 as a roadster. For the previous seven-passenger six, the price was \$1,450. In the seven-passenger touring model on the four-cylinder chassis, the cut has been \$100, making it \$885; while the new roadster is \$135 less than previously, or \$850.

The bodies are practically alike on four and six chassis, and most of the difference in wheelbase is taken up by the engine. The cars are made to conform to the same general design throughout, so far as possible. In fact, they are much more similar this year than ever before, and practically the only difference in addition to the difference in number of cylinders, are the wheelbase, rear axle gear ratio, and rear spring size.

Motor Received Most Attention

The main changes in the cars as compared with the previous types are in the redesigning of the engine for greater accessibility and quietness along with more power. The bore has been increased on both models from 3½ inches to 3¾ inches, the stroke remaining the same as it was at 5 inches. The cross shaft at the front has been removed, and there is a big change in the manifolding. The wheelbase has been lengthened on both chassis, the six getting 1 inch more, making it 122 inches, and the four having 4 inches added, to give it 112 inches.

Improvement in the clutch, enlarging of the propeller shaft, a general smoothing out of the lines of the bodies, changes and simplifications in the electric system and the wiring, the use of real leather upholstery and some other minor improvements in the chassis and frame, are points which will indicate that although Studebaker has



THREE 1916 STUDEBAKER MODELS

Top, the six-cylinder seven-passenger; center, four-cylinder five-passenger; bottom, six-cylinder landau-roadster which lists at \$1,350

seen fit to come down in the prices of its cars, there has been no curtailment of value.

In general, however, characteristic Studebaker design still holds in the mechanical make-up of the cars. The gearset is still in combination with the floating rear axle; a cone clutch is used; the Wagner electric lighting and cranking combination is employed; and the gasoline tank is in the cowl.

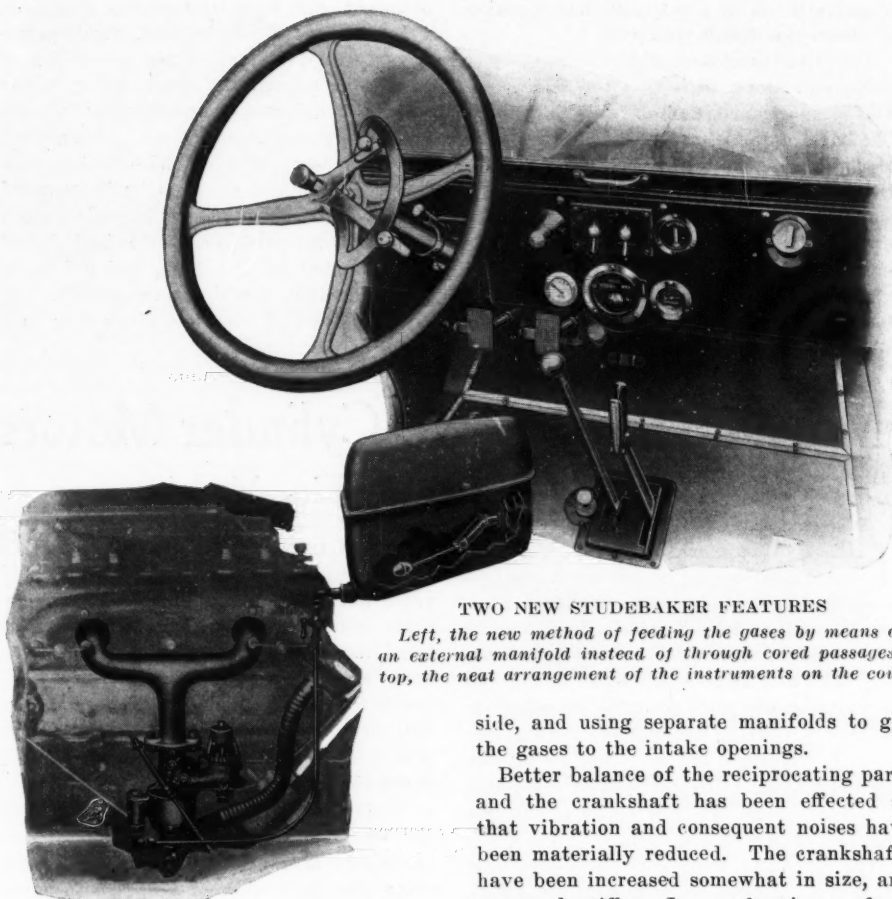
The increase of the bore of the motor, together with the other alterations, add about 22.5 per cent to the piston displacement and it is claimed that an even greater percentage of increase is made in the horsepower. The six has a displacement of 353.8 cubic inches, while the four has a 235.3 cubic inch capacity.

Probably the most important change in the engine design is in the removal of the cross shaft at the front. This was spirally

driven from the camshaft gear and operated the water pump on one end and the ignition distributor on the other. Now the pump is driven from the camshaft gear on the left, and the distributor is vertical and operated through bevel gear connection with the front end of the camshaft. The other unit effected by the change is the generator, which now sets on end with its armature shaft vertical and has spiral gear drive from the front gears. This is on the right side.

Starting Motor in New Position

The starting motor also is placed at the front and on the right side. It is arranged horizontally and drives the crankshaft through a roller chain connection and a housed-in train of reduction gearing. The chain is not inclosed, and is placed between the fan pulley and the gear housing. The driving sprocket has nine teeth, and the sprocket on the camshaft end has forty



TWO NEW STUDEBAKER FEATURES

Left, the new method of feeding the gases by means of an external manifold instead of through cored passages; top, the neat arrangement of the instruments on the coil

teeth. In the front gear driving system of the new motors, the matter of silence is provided for by the making of the mainshaft and generator gears of case-hardened steel, with the camshaft gear of cast iron. This makes steel run against iron.

Another big change is the abolition of the internally-cored passages for the distribution of the gases to the cylinders. The carbureter formerly occupied a position on the right side, and the gases thus went through the water jackets to the valves on the opposite side. Now, however, Studebaker has gone back to the original method of placing the carbureter on the valve

side, and using separate manifolds to get the gases to the intake openings.

Better balance of the reciprocating parts and the crankshaft has been effected so that vibration and consequent noises have been materially reduced. The crankshafts have been increased somewhat in size, and are much stiffer. Longer bearing surfaces of increased diameter are used, along with stiffer connecting rods. These are now provided with four cap bolts each instead of two.

Pistons Now Are Longer

Along with stiffer rods and larger crankshafts, the pistons have been lengthened $\frac{5}{8}$ inch to make them $4\frac{3}{8}$ inches long. This serves to minimize the cylinder wear, as does the lowering of the piston pin location. The pins now are secured to the pistons by set screws, which is in contrast to the old method of pressing them into the rod end with the bearing in the piston bosses.

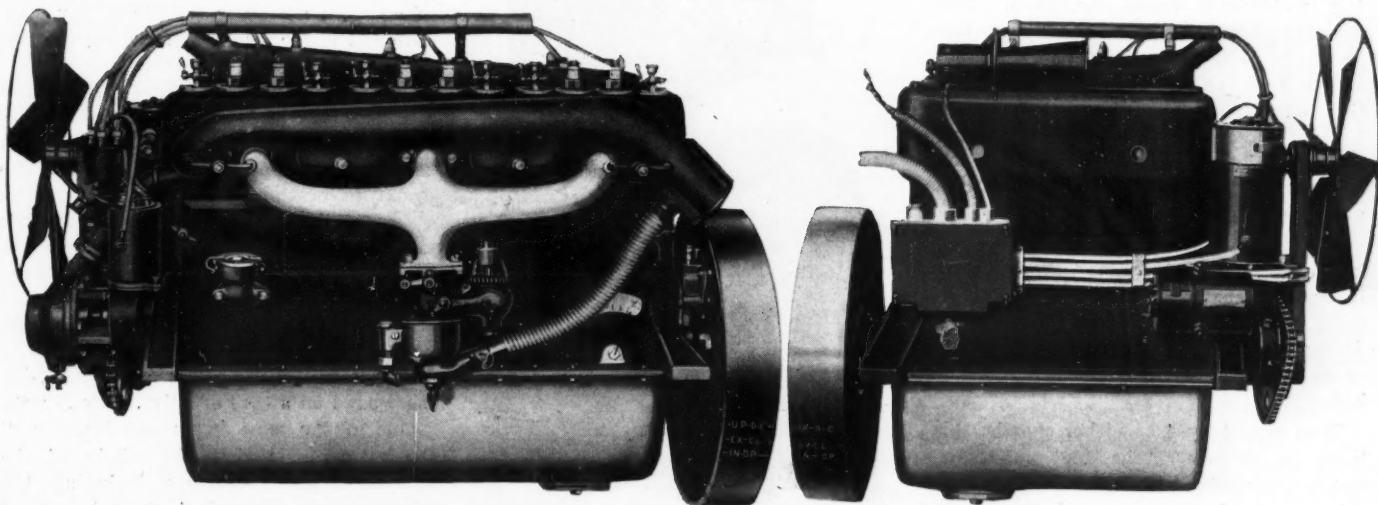
A change has also been made in the tappet design, making it much easier to take them out if necessary. They used to be made of mushroom shape, that is, with the big end at the bottom, making it compulsory to take them out through the crankcase. Now they are the same diameter all the way down, so that they can come out through the top as soon as the valve and spring are out of the way.

Gear Pump Supplants Plunger

There is a change in the circulating-splash oiling system, which is conducive to a more positive oiling at low engine speeds. The former plunger pump, located on the side of the crankcase and driven by a camshaft eccentric, has given way to a gear pump on the rear end of the camshaft. This also does away with the slight noise which the old type made. Also the sight feed on the dash has been replaced by a pump pressure indicator to show that the system is operating.

A clever improvement over former wiring of the electric system is made in the fitting of a junction box. Instead of being on the body, as might be expected, this box is placed on the right rear side of the engine, where it is very accessible. All wires go to this box, and there is practically none on the body with the exception of that going to the control apparatus on the instrument board. A cover plate over this junction box, held by four screws gives access to the wiring connections for the entire system. As this box is very close to the motor, the wiring is consequently short. All the wires run through waterproof conduits, and as the system is of the one-wire type, it makes a very simple layout.

Should it be necessary to remove the body from the chassis, the minimum disturbance of the wiring would be necessary, due to this mounting on chassis and motor. Further, it is usually considered that the greatest troubles from the electric systems of the modern car are due to the working loose of connections, and as most of them on these new Studebakers



THE SIX- AND FOUR-CYLINDER MOTOR USED ON THE NEW STUDEBAKER MODELS

Both of these engines have had the bore increased from $3\frac{1}{2}$ to $3\frac{3}{8}$, the rods have been made stronger and the piston length increased so as to reduce wear. Notice that the cross shaft formerly at the front of the motor is missing

are a part of the rigid portion of the machines, any body movements will not affect them.

The storage battery, a 100-ampere-hour Willard, is placed under the right front seat and attached to the frame in a special hanger. The electric system operates at 6 volts, and though the starting unit is smaller and of lighter weight, it is said to be more efficient, cranking the engine at higher speed through being geared higher.

Clutch Changed Slightly

In the clutch a change has been made to make this unit more serviceable. The former bronze clutch collar has been replaced by a ball-bearing throwout, this tending to less wear and requiring less attention.

Continuing back, the propeller shaft has been made more substantial, and whipping has been prevented by increasing the diameter from 1½ inch to 1.5-1.6 inch.

The gearset bolts through a flange to the pressed-steel housing of the rear axle, and on the left side of it, is attached a pressed-steel torsion arm, which runs forward to a mounting on the intermediate frame cross member. Radius rods run forward to the frame side members to do their part in preserving axle alignment. In the gearset there are no changes, the same design of chrome-nickel steel gears being used. The axle housing has been made heavier, however, this applying especially to the axle tubes. The four-cylinder chassis has an axle ratio of 4 to 1, and that of the six is 3.7 to 1. These ratios are said to be the result of repeated tests, and to handle the cars in excellent shape.

Brake operating shafts and equalizers now are carried on the rear axle unit, and the brakes and radius rods now swing on the same center, making for uniform brake action regardless of car load.

Spring Suspension Improved

The entire spring suspension has been gone over, and on all cars three-quarter elliptic rear springs are fitted, these being underslung from the axle. They measure 51 inches rear and 38 inches front on both cars. The previous four had elliptic rear springs, although the six used three-quarter elliptics. The cars are hung lower than formerly, this being brought about by the lowering of the rear springs along with the dropping of the front axle at the spring seats.

Frames have been strengthened by having fewer holes in them, and these are not in line, so that no weakening should result. Another minor chassis detail is the fitting of a long tail pipe to the muffler, so as to get away from noise under the body.

Tires are 34 by 4 on either chassis, this being an increase on the four, which formerly was shod with 33 by 4's. Straight sides are used, the rear set being of the non-skid type. A new form of rim also is supplied, the main feature of which is

a special form of pawl lock, which makes it easier to detach the tire.

The wheelbase increases give more body room, and along with this the bodies are well proportioned and of excellent lines. The back of the front seat has been shaped to fit the back, really making an individual back for each of the front passengers. A new form of auxiliary seat is provided. These fold into compartments in the floor of the tonneau, and when not in use, they are flush with the floor. But when unfolded they leave a sub-floor exposed, and upon this the seat

occupant can comfortably rest his feet.

In the control of the cars, the improvements are principally the providing of adjustable pedals, and the locating of the starter pedal more conveniently at the gearshift gate. A new dash arrangement has also been effected with the instruments all grouped so as to be illuminated by one light. The rotary electric switch has been removed from the heel board and mounted on the dash, and a lock is provided for the ignition switch. A vibrator type of horn has given way to a motor-driven type.

Magneto for Twelve-Cylinder Motors

Splitdorf Co. Brings Out First Model

THE first announcement of a magneto for twelve-cylinder motor car engines has just been made by the Splitdorf Electric Co. whose line of ignition instruments now contains models for every type of motor. The new twelve is a Dixie model and operates on the same principle as other instruments bearing this name, having stationary windings and no armature in the ordinary sense. The distributor is a compound type with the twelve contacts in two parallel planes of six each.

The Mason principle, on which the Dixie magnetos operate, is a radical departure from ordinary magneto practice, and possesses many features of interest. The rotating shaft passes through the magnet poles instead of between them and instead of

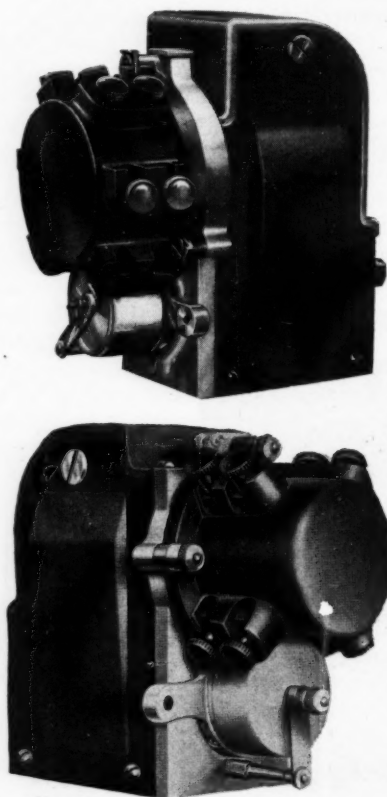
carrying an armature on which the windings are placed, this shaft carries two solid polar extensions separated by a non-magnetic distance piece. Surrounding these revolving pole pieces is a light laminated field structure, consisting of two pole pieces and a core on top. This core carries both primary and secondary windings. The principle of operation is that of sending magnetic lines alternately in opposite directions through the field structure. The pole extensions are simply a means of carrying the magnetic lines from the main magnet to the laminated field structure and that they do not change their polarity.

When the pole N is adjacent to one of the pole pieces the magnetic flux flows through the core of the windings from left to right. Continuing the rotation of the poles until they occupy a vertical position, it will be seen that the field of the magnetic is shorted through the pole pieces cutting out the magnetic flux entire from the core. Passing this point in rotation the pole extension N then comes into a position adjacent to the other pole, causing the magnetic lines to flow once more through the core, but this time in the opposite direction, that is, from right to left. This reversal of direction of the magnetic flux is of course a necessary feature in any magneto and is the means of inducing the current in the windings.

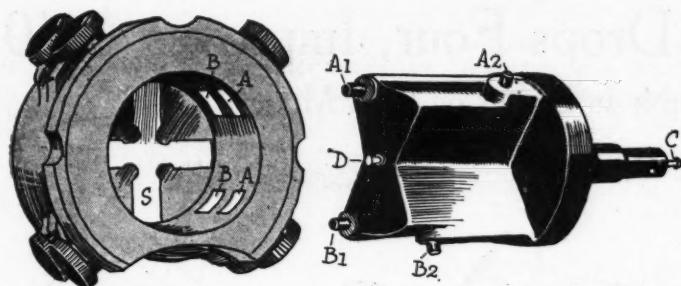
In order to render this reversal easy and complete, the path for the magnetic lines is made up of thin iron laminations such as are used also in the construction of the armature in the ordinary magneto. The Splitdorf company, however, makes the claim for the Dixie construction, that a point of great efficiency is obtained since the bulk of the iron in the stationary field structure is so small, its size being governed entirely by magnetic requirements.

The windings are remarkably small, being wound on a core of only .75 by .5 inch.

One of the most important features of the magneto is that the whole of the laminated pole structure including the windings can be rocked through several degrees. This rocking is accomplished by turning the timer arm of the circuit break-



ABOVE, SPLITDORF MODEL FOR TWELVE-CYLINDER MOTORS; BELOW, THE EIGHT-CYLINDER



SPLITDORF EIGHT CYLINDER DISTRIBUTER

er in the ordinary way to advance or retard the spark. By means of this positive connection between the field and the circuit breaker it is possible to arrange the instrument to produce the sparks either advanced or retarded at the critical moment when the most magnetic lines are being cut. Hence the magneto has no one point in its spark position when the intensity of the spark is maximum or minimum: it is uniform all the time, it is claimed.

Path of Current in Distributer

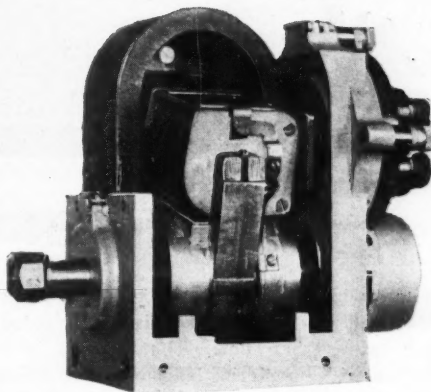
The distributor on the four and six-cylinder models consists of an insulating block with a short spindle at one end of which is a spring brush bearing on the contact quadrant on the windings. The high-tension current passes from this point to a radial arm on the distributor face and so to the outer terminals of the instrument. A good feature is the shortness of the path for the current from the windings to the terminals. A safety spark gap is included in the high-tension circuit at the base of the windings, and the condenser is located on top.

In the circuit breaker nothing revolves except the cam attached to the shaft. By this construction it is possible to adjust the contact points while running as the contact bases are stationary. The grounding terminal is insulated on the end of the spring clip which holds the breaker cover in position and as it bears on the center of the cover, the ground wire also is stationary while moving the timer arm.

The four and six-cylinder instruments are identical in every respect except for the distributor and timing gears. In the eight and twelve-cylinder models the shape of the rocking field and also the polar extensions are changed so that four sparks can be produced in each revolution.

Compound Distributers Used

As it is practically impossible to obtain more than six contacts in a flat distributor disk of ordinary construction a particularly ingenious compound distributor has been designed for the eights and twelves, in which the terminals are not arranged in one plane as in the four and six-cylinder models but in two parallel planes. In the compound distributor block on the eight-cylinder instrument the high-tension current is led through the center of the block from the brush C, as shown above, in contact with the windings, to the brush D which bears on the center of the cruciform contact plate S embedded in the distributor box. This plate has no connection with any



SHOWING INTERIOR CONSTRUCTION OF SPLITDORF DIXIE

terminal, but is a means of conducting the current in turn to the eight terminals as follows: In operation the plate S becomes live by contact with the brush D as before explained. Rotating over the ends of S are the two brushes A1 and B1 connected respectively to two similar brushes A2 and B2 in the side of the block. The path of the brush B2 includes the four contact pieces B connected to four of the terminals while the other brush, A2, rotates in the path of the terminal plates A connected to the remaining four terminals. Since the two brushes A1 and B1 are arranged 135 degrees apart it follows that eight sparks will be distributed to their respective terminals in one revolution of the distributor block in equal divisions of time. The timer gear is in the ratio of 2 to 1 so that this magneto runs at engine speed, an unusual feature of an eight-cylinder magneto. On the twelve the distributor gear ratio is 3 to 1 requiring a speed of one-and-one-half times the engine speed.

The distributor for the twelves is identical in every respect except that the contact star at the base of the box is six-pointed instead of four to supply the twelve terminals which are arranged in two layers, as shown in the external view on the previous page.

INVENTS PROCESS TO MAKE RUBBER

Cleveland, O., June 30—Dr. Lyman A. Noble, an electric therapist of this city, claims to have discovered a substitute for rubber, combining all the qualities of natural rubber. He states that the chief ingredient of his product is coal tar.

Mr. Noble has been experimenting for nearly a year. His first experiments failed because the resulting product was greatly

lacking in resiliency. This he found was solely a matter of process, and the use of a high frequency, high voltage electric current has eliminated the difficulties. By evaporating the liquid combination of ingredients and submitting them to a high frequency current for an extended time, 6 hours, the result was attained.

From 200,000 to 500,000 volts of electricity of high frequency was necessary to produce the rubber. The various ingredients are mixed, by secret formula, into a liquid which, under heat, is evaporated down to one-quarter of its original mass. When it has reached a consistency of a thick syrup, the mass is placed in a metal retort and connected with a high frequency electrical machine. The retort forms one pole and the other pole is suspended in the liquid. The current is turned on and after 6 hours, the retort contains a black, spongy substance with all the qualities, Dr. Noble claims, of natural rubber.

The inventor claims that with the artificial rubber the cost of a 37 by 5-inch tire will not be more than \$15, or \$60 for a set of four. He states that a company is being organized to manufacture his product on a large scale, and a plant will be built in Cleveland.

MAKING NEW COPPER ALLOY

Milwaukee, Wis., June 30—After nearly 7 years of experimentation by A. Littmann, a Milwaukee metallurgist, the American Metal Products Co., Milwaukee, announces that it is now marketing a new copper alloy designated as Ampeo bronze which is of peculiar interest to the motor car and allied industries because of the unusual properties of the metal. It is claimed to possess the strength of steel; can be die-cast to a finished state in steel molds; can be annealed or softened; stands acid tests; is non-corrosive and 18 per cent lighter than brass. The company is increasing its capital stock from \$25,000 to \$100,000 to accommodate the increased activities resulting from the marketing of the new metal.

OVERLANDS FOR PRIZE SALESMEN

Toledo, O., June 29—Forty 1916 Overland cars will be given away as prizes to leading salesmen of the companies affiliated with the Rice Leaders of the World Association, June 26. The presentation of these new cars takes place publicly in New York.

The contest, for which the cars are given as prizes, has been in progress for the past year among the various companies in the Rice organization. In addition to the motor cars, \$30,000 worth of gold watches will be given away to those men who made a creditable showing in the contest.

The formal presentation of the Overland cars in the afternoon will be followed by a motor parade through the principal thoroughfares of Manhattan. The parade will be followed in the evening by a grand banquet at the Waldorf-Astoria.

Moon Brings Out New Six, Drops Four, Improves 6-40

Later Reduced to \$1,475—Tumble-In Bodies on Both Models

ATTRACTIONS IN 1916 MOON SIXES

Small model at \$1,195 as five-passenger

Uses new type Continental motor
Model 6-40 continued with changes

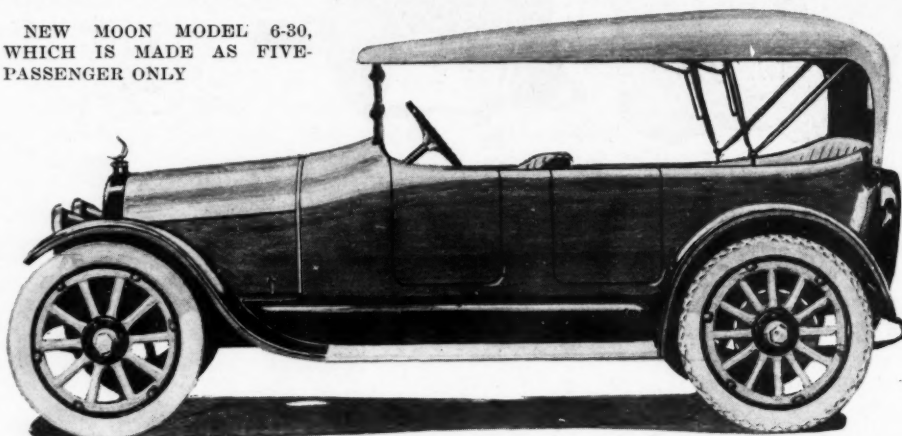
Body shows most improvement
Wheelbase increased 123 to 125

Longer rear springs

Spiral-bevel axle instead of straight

Tubular instead of solid propeller shaft

NEW MOON MODEL 6-30,
WHICH IS MADE AS FIVE-PASSENGER ONLY



FOLLOWING the plans of many motor car builders in confining their efforts to the building of six-cylinder models only, the Moon Motor Car Co., St. Louis, Mo., announces as its 1916 line two types, a new five-passenger model 6-30 at \$1,195 and a continuation of the 1915, 6-40 at a price reduction of \$125 bringing it down to \$1,475. The four-cylinder is discontinued.

Moon engineers have endeavored to make both sixes as much alike as possible and while there are slight differences in the size of some of the parts and in the motor design the general appearance of the mechanical units is the same. As to outward appearance the only apparent difference is in the hood length.

General Features of the 6-30

The new six is a trim job using the new type Continental 3¼ by 4½ motor fitted with Delco cranking, lighting and ignition units and Stewart vacuum feed system. The clutch is disk in unit with the motor, the gearset a three-speed and the drive by hollow shaft to a floating axle. Tires are 33 by 4, the wheelbase 118 inches and the body a newly-designed one.

While the model 6-40 is continued at a lower price, it has been improved in design rather than cheapened in construction to meet the new figure. The most noticeable improvement is in the body which is a de-

whose widest portion is back of the front seat and whose sides are slightly rounded out rather than flat. The tonneau is 3 inches wider and the length of the front compartment increased so as to offer greater freedom of movement for the legs of the driver. An odd form of front seat has been adopted and in this, while the seat is not broken by an aisle, there is a division in the back upholstery which practically forms individual seats. The body is trimmed in Spanish leather and has two

extra seats which fold into the back of the front seat.

The wheelbase of the 6-40 has been increased from 123 to 125 inches, which has allowed of making the body roomier, as stated above; the rear springs have been made longer, spiral-bevel axle gears supplant the straight bevel of the past season, a new type of Delco cranking, lighting and ignition system installed and the propeller shaft now is tubular instead of solid.

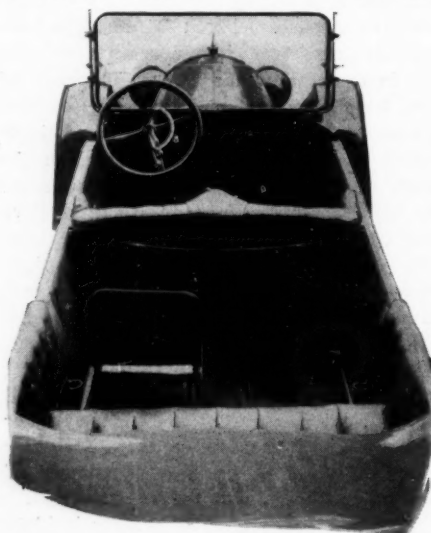
The Continental 3¼ by 5 motor has been altered but slightly, the most important being a change front cast-iron timing gears to cloth ones in order to obtain quieter operation. The motor is fitted with a Rayfield carburetor fed from a Stewart vacuum tank fastened by a bracket to the cylinder casting. The carburetor has a very short inlet manifold which feeds the valves, which are on the opposite side, through cored passages in the casting. The exhaust manifold also being on the right side, a hot air connection from the carburetor is run through a passage between the third and fourth cylinders, and the hot-water outlet connection is practically a vertical copper pipe attaching to the water outlet of the cylinders.

Single-Unit Delco System Used

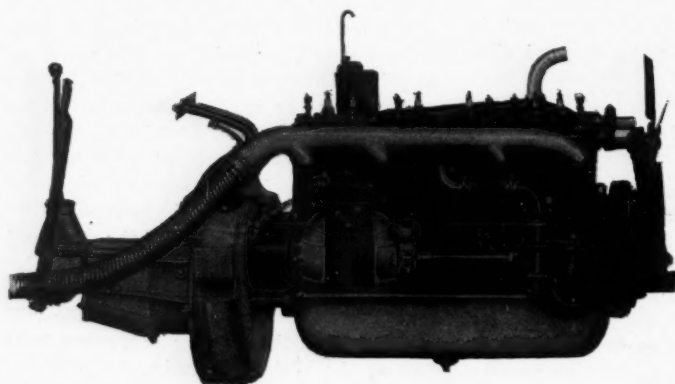
The 6-volt Delco combined cranking, lighting and ignition unit is on the left side and connects to the flywheel through reduction gears. When operating as a generator it is driven by the water-pump shaft. On the right side also, is the exhaust manifold which has attached, a flexible tube instead of a non-flexible metal pipe for carrying away the exhaust gases.

The oiling system is the same combination splash and force feed as used on other large Continental motors.

The drive from the motor is taken by a dry-disk clutch and three-speed gearset in unit and thence by a double-universal shaft to a floating axle. Propulsion is by the Hotchkiss method. Tires are 34 by 4 straight side and an extra tire carrier is in the rear.



VIEW OF THE MODEL 6-40 MOON, SHOWING
THE V BETWEEN FRONT SEATS



CONTINENTAL
MOTOR USED IN
MOON 6-30

The general features of the new model are the same as those of the 6-40 just described, but of course, the parts are smaller in proportion. The motor is the latest type of Continental, described on this page.

It is fitted with the same Delco system used on the large model and driving a floating axle through units of the same design. The equipment includes all that is considered stock today.

Continental Has a New Six Motor

Size 3 1-4x4 1-2—Horsepower 35 at 1,600 r. p. m.

THE first of the several new Continental motors to be announced by the Continental Motor Co., Detroit, Mich., is a light six 3¼-inch bore by 4½-inch stroke. As a performer, the engine is a fairly high-speed type, since it develops 35 horsepower at about 1,600 revolutions per minute, and will run up to 2,500 revolutions, the peak of the power curve being well up towards the maximum speed.

Apart from the neat appearance, perhaps the most remarkable feature of the motor is the very large size of the crankshaft, which is no less than 2¼-inches diameter. This, it is claimed, completely overcomes torsional vibrations, which is an advantage from the point of view of comfort and also because it tends greatly to reduce noise in the timing gears at the front end. This highly desirable quietness is increased by the use of a new compressed cloth material for the camshaft gear and an engine which was examined on the test block proved that the gearing is almost completely quiet at moderate crankshaft speeds.

Little Aluminum Used

There is but little aluminum in the motor as the cylinders and upper part of the crankcase are integral, but the flywheel housing is aluminum. This saves quite some weight and, as the bottom portion of the crankcase is pressed steel the whole motor is reasonably light.

Valves are accessible by the removal of a cast-iron detachable cylinder head, which is in one piece, and the valve springs and tappets are located on the right side, behind the usual inclosing plates. On the right side also is the magneto, when this form of ignition is employed, or the gen-

erator and ignition unit. Drive for these attachments is obtained by a shaft passing through the water pump and there are openings on either side of the aluminum flywheel housing, so that almost any sort of cranking motor can be attached on right or left, as preferred. On the left side there is nothing but the carbureter, which bolts directly to the cylinder block, all intake passages being internal, but the exhaust manifold, as usual, is a separate part.

Lubrication is the combination force feed, with dip troughs for the rod ends, generally associated with Continental motor practice. Oil under pressure goes to the three crankshaft bearings and to the helical timing gearing. Overflow thence fills the dip troughs and splashes on the connecting rod bearing caps distributed the oil to all other parts.

As instancing the convenience of this motor to car manufacturers, it should be observed that the practice of making the flywheel housing in aluminum, bolted to the iron of the crankcase, enables the housing to be varied a little to suit individual makers' requirements. The standard housing is one of the S. A. E. sizes which the society expects to standardize shortly, but it is possible to alter this without much added expense.

For setting the motor in the frame, a three-point suspension is arranged in such a way that there are four points of attachment to the chassis, and this is easier to provide than three points with a swivel bracket on one of the cross rails. At the rear end of the motor are the usual aluminum arms integral with the flywheel housing, and to the front end is attached

a drop-forged beam. The two ends of this beam can be bolted to the car frame and the front end of the motor hangs from the middle of the beam.

It is understood that the price to manufacturers of this new engine is distinctly lower than that of any previous Continental models, either four or six-cylinder, of equivalent piston displacement, this being made possible by a design that is a trifle more simple as a manufacturing proposition. Certainly, the Continental company has never made a neater looking job, nor one that runs more smoothly, judging from the motor on the test block.

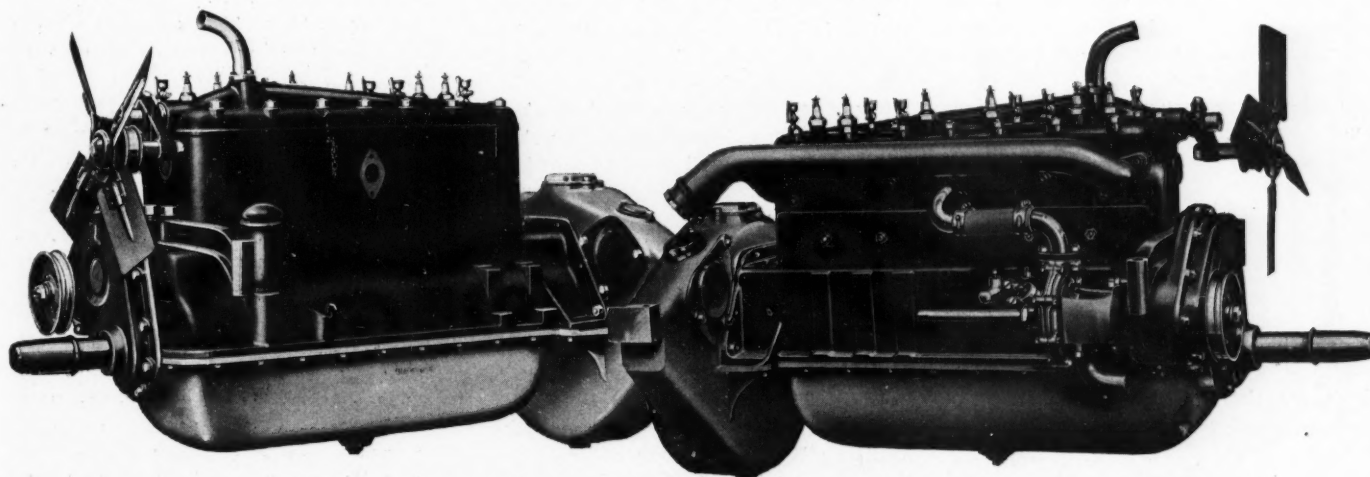
Great developments are in progress at the Muskegon plant of the company, where a new three-story building, 60 by 150 feet, is being erected. Two lines of test blocks to accommodate 100 more motors are being added to the test room at Detroit and sundry small building additions are also being made to this plant. While trade has never before been so brisk, the company expects it to be still better during the year and has had to refuse consideration of some substantial foreign orders owing to its inability to do more than satisfy the most pressing part of the home demand.

WHITE MEN GET WAGE INCREASE

Cleveland, O., June 30—About 3,800 employees of the White Co., will receive increases in wages amounting totally to about \$1,786 a day. The move is an effort of the company to keep the good men it has in its employ. The demand for war material, according to the president of the company, Windsor T. White, has created a scarcity of skilled labor in this field.

Under the new schedule, all men on day work will receive the same pay for 8 hours that they have been receiving for 9 hours' work. Time and a half will be paid for the ninth hour and all other hours of overtime.

The factory is to run 9 or more hours daily as long as the work holds out. A man who has been earning 25 cents an hour during a 9-hour day will now receive \$2.25 for 8 hours' work and an additional 42 cents for the ninth hour.



TWO VIEWS OF THE NEW CONTINENTAL SIX WHICH DEVELOPS 35 HORSEPOWER AT 1,600 R. P. M.



The Readers' Clearing House



MAKING A TRUCK CUT ENSILAGE How a Reo May be Used for Doing Work on the Farm

DES PLAINES, Ill.—Editor Motor Age—I have a Reo model J truck and am desirous of using it to drive a cutter for my ensilage. Has Motor Age any suggestions to offer me as I understand this has been done by several farmers throughout the country and thought perhaps you would have the best information regarding this matter. Would it be better to drive this off the jack shaft or make some attachment to one of the rear wheels.—Chas. Boesche.

You could run the cutter from a rear wheel sprocket by means of a chain, or remove one of the rear wheels and use the jackshaft, as shown in Fig. 1. One wheel must be clamped firmly to the ground, so the one operating the cutter will take the power.

ADVANTAGES OF DRIVE METHODS Friction the Simplest—Is the Eight-Cylinder Practical?

CORNING, Calif.—Editor Motor Age—Explain the action of the double-piston motor, as used by the Gobron Company of France.

2—Is the eight-cylinder Knight motor practical?

3—What horsepower does the Baby Peugeot with a 72-inch wheelbase and 34-inch tread develop?

4—What are the advantages of the shaft drive, chain drive, and of the friction?

5—Who manufactures the highest-powered stock car?

6—Kindly give me the specifications, and horsepower of the following racing cars: Ralph de Palma's Mercedes, the two Sunbeams which ran in the 1915 500-mile race, also the Peugeot racing cars, and the Delage which ran in the same race?

7—Who manufactures the following cars: Cino, Bugatti, Anasagasti of Argentine, Mors, Charron and the Metallurgique?—Donald K. Kempton.

1—Read the answer to George Hayden in the May 27 issue of Motor Age in this department.

2—No motor of this type has been announced up to this time, but it should be a practical construction.

3—Motor Age does not know.

4—The shaft drive is simple, easily lubricated, requires practically no care, is not heavy, cumbersome or noisy and makes an ideal drive method for passenger cars. The chain drive is good for the reason it allows of better reduction to the wheels. However, it is noisy and requires more care than the shaft, and it is hard to lubricate the chains properly. The friction drive is the simplest of all and weighs much less than any other form, is more easily operated, is cheaper and has a low operating cost.

5—This is a hard question to answer, because the power curves of all motors made are not available. In this country the Simplex 50 should be one of those in front. It has a four-cylinder motor, 5.375 by 6.5, and develops 46 horsepower at 1,000 feet per minute piston speed. Then there are the eights to consider. The Cadillac's motor develops over 70 horsepower.

6—Descriptions of these cars appeared in the May 27 issue of Motor Age, page 20.

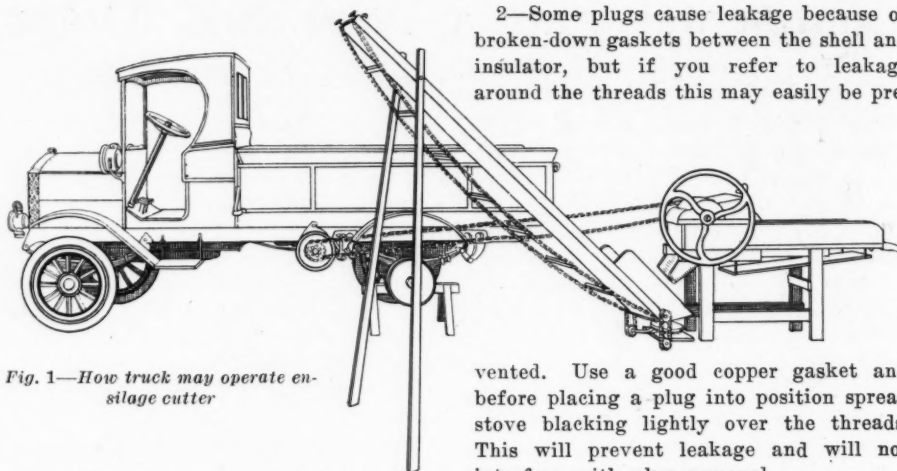


Fig. 1—How truck may operate ensilage cutter

7—Cino was manufactured by Haberer & Co., Cincinnati, O.

Bugatti—Bugatti Construction d'Automobiles, a Molsheim, Alsace, France.

Mors—Mors, 48 Rue du Theatre, Paris, France.

Charron—Charron, Ltd., 7 Rue Ampere, Puteaux, Seine, France.

Metallurgique—Metallurgique—Societe An I'Auto Metallurgique, Marchienne-au-Pont, Belgium.

HOW SPARK PLUGS MAY BE TESTED Should Be Checked for Resistance, Leakage and Cracked Insulators

LA SALLE, Ill.—Editor Motor Age—Please tell me how a spark plug may be tested to see if it is fit for use.

2—How may a spark plug be fixed so it will not lose compression. I find the garage-men just screw them in tightly, but when tested with oil, I find some of them, if not all of them leak more or less.—F. B. Elliott.

1—A simple way of testing a plug to see whether or not it will spark is as follows: Remove the plug from the cylinder and attach the plug cable. Lay the plug on top of the cylinder so that the plug shell touches the casting. By cranking the motor the plug will spark if it is good and will show no results if something is wrong. It should be remembered that it is quite easy for a spark to jump a gap in air, so that if the spark is rather weak when the plug is being tested it is likely there will be insufficient spark under compression. Spark plugs also should be tested for cracked insulation and this may be done in two ways. One consists in running the motor in a very dark room. By looking at the plugs, a cracked insulator may show itself, because there may be arcing at a point of rupture. The other consists in visual examination either with the plug taken apart or assembled. Spark plugs also should be tested for leakage. This is best done while the plugs are in the motor with the latter operating. A little oil should be squirted around the plug joints and if there is a leak a small bubble will appear.

2—Some plugs cause leakage because of broken-down gaskets between the shell and insulator, but if you refer to leakage around the threads this may easily be prevented.

Use a good copper gasket and before placing a plug into position spread stove blacking lightly over the threads. This will prevent leakage and will not interfere with plug removal.

DIMS LIGHTS WHEN MEETING CAR Says Act Is Appreciated by Driver of On-Coming Vehicle

FOREST, Ohio—Editor Motor Age—For the last 3 years I have been driving cars that have been equipped with storage batteries and lights. These, as you know, give a brilliant light, and are very dazzling when you approach another car or meet a vehicle. I have been practicing as much as possible turning my lights over on the dimmers until I have passed the car or buggy. This makes it much pleasanter for the person that I am meeting. Once in a great while, after I have turned down my lights, the approaching driver does the same.

I have wondered why manufacturers do not place the dimming switch or button on the steering wheel or some other convenient place.—A Reader.

QUESTIONS ON VACUUM OIL SYSTEM Lubricant Will Not Flow if Spout Is Covered and Tank Air-Tight

JASPER, Mich.—Editor Motor Age—Please give a drawing to represent the vacuum oiling system which is used on the Saxon cars?

2—How large an oil reservoir is generally used on cars of 20 horsepower or more?

3—If an oil tank which is used as a reservoir is of the correct size for the car that it is designed for, would the weight of the oil overcome the vacuum and cause an excess amount of oil to flow to the crankcase, if the tank were placed 3 feet above the outlet of the oil in the crankcase?

4—Is there any oil tank that is used in connection with the vacuum oiling system made at the present time that has a section of glass built in the tank to show the amount of oil in the same? Would it be a difficult matter to build one that way and keep it air-tight?

5—What would be the cause of a Ford car misfiring when running on slow speed if the valves were alright also the carburetor and this car fires perfectly on all four-cylinders when running on high speed?

6—Give the S. A. E. rating of the Overland model 83, Reo, Maxwell 25 and the Dodge car?—W. F.

1—A similar system was fully described and illustrated in the April 22 issue of Motor Age, in this department.

2—Three quarts is a good average.

3—It does not matter how high the tank is placed.

4—There are gauges used in connection with such tanks. It is not a difficult job installing a gauge.

5—You probably will get the correct answer to this by reading the answer to B. B. Graves, in this department.

6—The Overland model 83 is rated at 27.25 horsepower, the Reo four at 27.20, and the six at 30.51; the Maxwell at 21.08 and the Dodge at 24.22.

BOB BURMAN TRAVELED 141.7 M.P.M. Made Record in a Blitzen Benz in 1911— Power in Each Cylinder

Corning, Cal.—Editor Motor Age—In operating a car with four-cylinders with a four-unit vibrating coil, when one or two of these units burn out, how are they connected so all four-cylinders will operate on two or three units?

2—On a car with four or more cylinders, how can it be determined whether all cylinders are working as they should and developing the same amount of power?

3—What is the fastest time ever made in America by a gas car, where and by whom?—Ben T. Torrey.

1—If the system is similar to that employed on the Ford car it cannot be done except by the use of a high-tension timer.

2—Without making delicate tests, it is hard to determine with any degree of accuracy the power developed by each cylinder, but for ordinary purposes the compression in each cylinder should be satisfactory. The compression pressure may be measured with an ordinary gauge screwed into one of the cylinder openings. By turning the motor over slowly with a hand crank one can usually feel any difference in resistance to turning of the different cylinders. The power per cylinder will also be dependent upon the spark and hence the plug gaps in all cylinders must be the same with the same compression.

3—The fastest time made in this country by any type of power-propelled vehicle is 141.7 miles per hour. This was made by Bob Burman, who drove a Blitzen Benz 1 mile in 25.40 seconds at Daytona, Fla., on April 23, 1911.

How to Figure Displacement

St. Louis, Mo.—Editor Motor Age—Tell me the piston displacement of the new Packard twelve-cylinder 3 by 5, in cubic inches, and how many cubic inches equal one horsepower.

2—Please tell how to figure the displacement?—J. B. Wahl.

1—The Packard twelve has a piston displacement of 424 cubic inches.

The displacement is not the measure of the horsepower of a motor. Read the answer to W. W. M. in this department.

2—The formula for displacement is expressed:

$$\text{Displacement} = d^2 \times .7854 \times N \times S$$

where d is the bore of the motor in inches

N, the number of cylinders

and S, the stroke in inches.

Thus, for the Packard 3 by 5, twelve-cylinder motor, the displacement is:

$$3 \times 3 \times .7854 \times 12 \times 5 \text{ or } 424 \text{ cubic inches.}$$

Displacement and Horsepower

Valentine, Neb.—Editor Motor Age—Assuming two motors to be equally well made and mounted in cars equally well made, which would pick up speed quicker from a standing start or when running very slow, a motor with a bore and stroke about equal

or a motor with small bore and long stroke?

2—In comparing the horsepower of motors, assuming they are equally well designed and made, would it not be as near correct as is possible to get, without testing the different motors, to take the piston displacement as a guide to the power regardless of the number of cylinders?—W. W. M.

1—The stroke of the motor is no measure of its ability to pick up. It can be shown that a short-stroke motor will perform just as well if not better than a long stroke when pick-up is considered, and it also can be shown that a certain type of long stroke motor will outclass the short-stroke in this respect. There are more things to consider than stroke.

2—Displacement alone is no measure of the power of a motor. This has been proven often. The Peugeot driven by Duray in the 1914 500-mile race has only 183 cubic inches displacement, yet the motor has considerably more power than many of the larger engines. This is due to the valve design, manifold design, valve timing, etc.

IS INTERESTED IN RACING CARS Desires to Purchase One for Use in Road Races—Mechanician's Pay

Crookston, Minn.—Editor Motor Age—Where can I get a racing body made like the racing cars have?

2—Does Motor Age think the Ford will finish inside the money in the Phoenix road race?

3—Where do Louis Disbrow, Eddie Rickenbacker and Gil Anderson live?

4—How can I get on as a race driver for any of the different companies that have racing cars?

5—When a driver is driving for a company such as the Maxwell or Mercer, does he get a salary and part of the prize money or does he get all of it?

6—What salary does the mechanician get? Also the pit attendant.

7—What is the price of an average racing car?

8—If a person desired to purchase a racing car and enter for himself, what clearance should a car have for the road race from Los Angeles to El Paso?—H. Williams.

1—You will have to have one built by a body maker or do the work yourself.

2—This is a question Motor Age cannot answer.

3—Rickenbacher lives in Columbus, O., when not traveling around with his team; Gil Anderson is a resident of Indianapolis; Motor Age does not know Disbrow's address.

4—This is a hard thing to do unless you have had a great deal of experience, both as mechanician and driver. You will have to start from the bottom and get a name before you can handle a car belonging to one of the large concerns now in the racing game.

5—This is a matter settled between the driver and the company. Some concerns pay the driver a salary, pay his expenses and also give him part of the prize money. Other concerns use a different arrangement.

6—The mechanician usually gets a small salary, depending, of course, upon his driver, and he also shares in the prize money. His share of the latter will depend upon the generosity of the entrant or driver, unless arrangements have been to take a percentage of the winnings.

A pit attendant may get nothing or he may get a few dollars from the driver or entrant. If the team wins, he may

get a little more. If he travels with the team he may work on a salary.

7—The price of the average high-powered, special racing cars is in the neighborhood of \$10,000, considering parts junked during development.

8—A 9-inch clearance would be enough.

Shifter Lever Drops Out of High

Memphis, Tenn.—Editor Motor Age—I have a Warren 1912 car and have a little trouble with the gearset. When running in high gear the lever often slips forward out of gear. Can Motor Age suggest the cause?—Reader.

1—This may be due to a worn sliding pinion or a worn high speed gear, also to the fact that the gears do not mesh properly, that is, they go into mesh only half way. The spring-backed plunger which holds the shifter fork in place at the different speeds may be worn too much.

What Is a Streamline Body?

Zearing, Ia.—Editor Motor Age—What is the trouble in charging a set of storage batteries. The voltage seems to be all right but the amperage doesn't come up?

2—What is a full streamline body?—Earl Allen.

1—If you wish the amperage to increase you will have to increase your voltage.

2—This would appear cigar-shaped.

Disk Clutch Slips

Watseka, Ill.—Editor Motor Age—I have trouble with my clutch. It slips when I am in high gear when I get into bad roads. The car is a Marion 1909 model 40.—Harry Troup.

When trouble of this sort occurs in running-in-oil clutches, it usually is caused by worn plates, poor lubricant, or insufficient spring tension. It may be possible that the plates are now so worn that one or two may have to be added. If the plates have cork inserts, these may have to be renewed. It is a good plan to remove the old oil, flush the clutch case with kerosene and then use a mixture of half kerosene and half oil.

Power Loss from Muffler

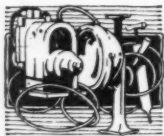
Hope, N. D.—Editor Motor Age—What is the back pressure on a motor car engine with a muffler on? Is it very great on a four, six or eight-cylinder engine and what is it on each?—Harry Sims.

The back pressure will vary in different motors, even those of the same number of cylinders. In a test made on a four-cylinder motor of one make, it was found that the loss of power due to back pressure was 1.3 horsepower at 600 r.p.m. and 2.5 at 1,300 r.p.m. This test was made on an old type of motor and muffler and the figures will be much lower for present-day construction.

Questions Answered and Communications Received

Charles Boesch.....Des Plaines, Ill.
D. K. Kempton.....Corning, Cal.
F. B. Elliott.....LaSalle, Ill.
Reader.....Forest, O.
W. F.....Jasper, Mich.
B. T. Torrey.....Corning, Cal.
J. B. Wahl.....St. Louis, Mo.
W. W. M.....Valentine, Neb.
H. Williams.....Crookston, Minn.
Reader.....Memphis, Tenn.
Earl Allen.....Zearing, Ia.
Harry Troup.....Watsseka, Ill.
Harry Sims.....Hope, N. D.

No communications not signed with the writer's name and address will be answered.



The Accessory Corner



FIG. 1—SLIP-OVER WORK SUIT

This is a one-piece garment with self-closing sleeves and has a collar which may be transformed into a hood for the head

Slip-Over Work Suit

THE illustration in Fig. 1 shows a one-piece work suit called the Slip-Over, made by the Slip Over Suit Co., Reading, Penn. This suit, which sells for \$1.50, will be appreciated by the motorist who works on his own car. The sleeves are self-closing

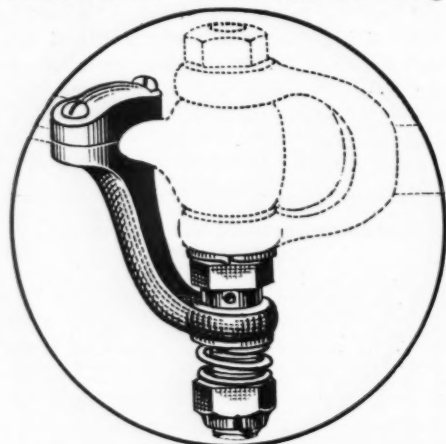


FIG. 2—KNUCKLE ANTI-RATTLER

This device is intended to be installed as shown and is said to prevent rattling of the steering joint. It is made by the King Specialty Co., Brookline, Mass. It was described in last week's issue of Motor Age

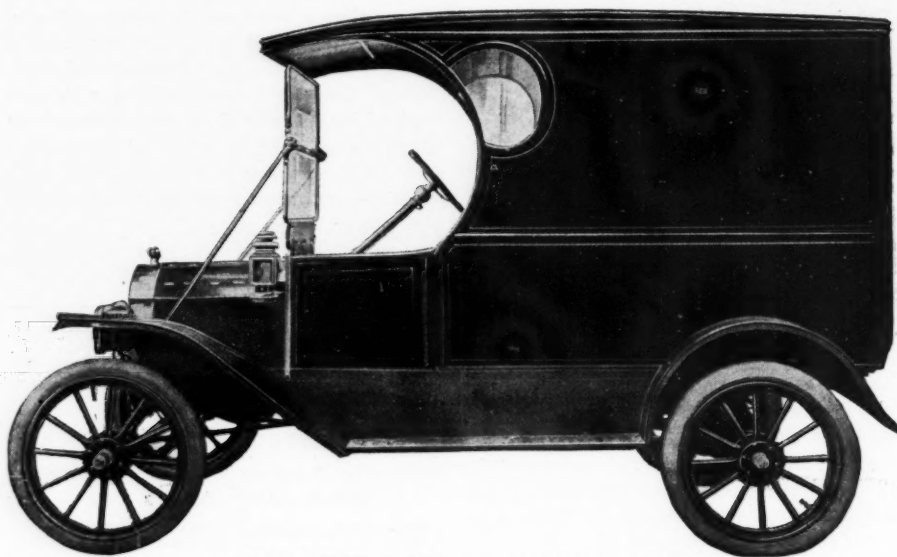


FIG. 3—COMMERCIAL BODY FOR FORD CARS

This is one design made by the Commercial Body Co., St. Louis, Mo. That shown is a new type made entirely of steel

and the collar may be transformed into a covering for the head. A belt attached allows of the suit being fitted tightly or loosely at the waist.

Jitney Bus Fare Box

A fare box designed especially for jitney buses is that made by the Jitney Fare Box Co., 5314 St. Clair avenue, Cleveland, O. This box is similar to those used on many of the electric street cars and is made of polished aluminum and nickel-plated steel with $\frac{1}{4}$ -inch plate glass at the top as shown in the illustration in Fig. 7. The dimensions are $4\frac{1}{4}$ by $4\frac{1}{4}$ by 13 inches and it may be attached to the dash or other convenient part of the car in 5 minutes by means of screws. Price is \$15.

Taylor-Rochester Hydrometer

An hydrometer, for use in testing battery solution, is made by the Taylor Instrument Companies, Rochester, N. Y., and sells for \$1.15. This instrument, called the Chargometer, has a wide upper portion so there is little tendency for the floating portion to stick to the sides. The scale is graduated from 1.150 to 1.300 by .01 degrees and standardized at 70 degrees Fahrenheit. It is 10 inches long and packed in a special case to protect it from breakage.

Copithorn Wire Wheels

A wire wheel, which is interchangeable with the wooden type supplied with the Ford car, is announced by the Copithorn Rim & Tire Co., 262 Washington street, Boston, Mass. A feature of this wheel is that it employs a demountable rim which is convertible so as to receive either clincher or straight side tires. The rim

is demounted by removal of one nut. These wheels are double-laced to a steel felloe.

Power-O Fuel Saver

A liquid called Power-O is being manufactured by the Cycle & Auto Supply Co., Buffalo, N. Y., and it is claimed that when added to gasoline in certain proportions increases the mileage per gallon and power of the motor. The substance is sold in 4, 8 and 12 ounce bottles, the prices being 60 cents, \$1 and \$1.50 respectively.

Hamr-Handl Screw-Driver

A useful combination tool is the Hamr-Handl Screwdriver made by the Crescent Tool Co., Jamestown, N. Y. This tool has a movable metal handle which is solid and which may be used as a hammer, as shown in Fig. 6, to start a screw into place.

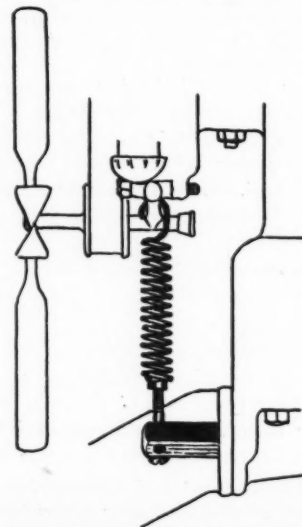


FIG. 4—FAN BELT ADJUSTER

An attachment for Ford cars which is said to keep the tension on the fan belt constant

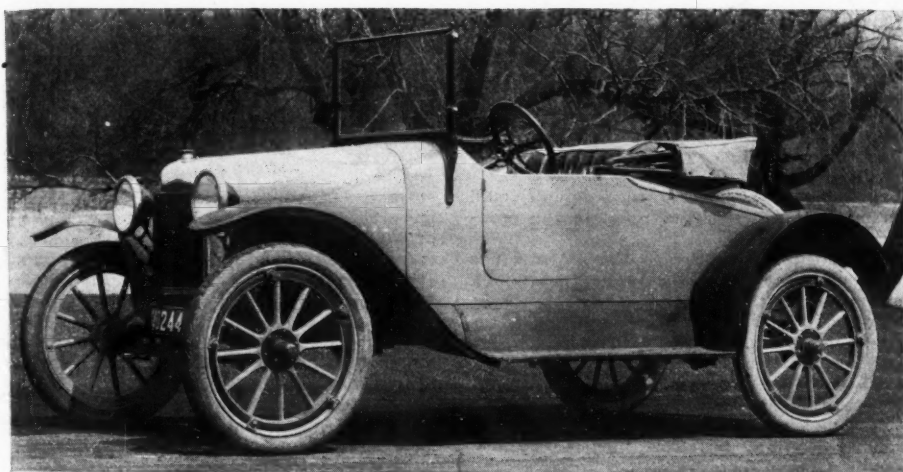


FIG. 5—DAVIS-BOYER BODY AND PARTS FOR FORD CARS

The outfit consists not only of the body with fenders, etc., but radiator, windshield, apron and lamp bracket extensions. The car hardly can be recognized as a Ford

After this the handle is pointed upwards in the regular manner and the screwdriver used to turn the screw and after this has been turned so far that work is difficult, the handle may be turned as shown, and a greater leverage obtained. The blade is drop-forged, hardened and tempered, and the handle is knurled to effect a better grip. The overall length is 10 inches.

Cellu-Fix

A celluloid cement for use in patching curtain panes is being offered by the Auto Products Co., 5739 Elmer street, Pittsburgh, Pa., under the name of Cellu-Fix. This is a liquid preparation sold in ½ ounce bottles for 35 cents including a small brush. It is stated one bottle contains. Sufficient to repair twelve or more tears of 3 square inches each.

Titan Bronze

A new metal called Titan bronze has been developed and it is claimed to take the place of brass castings. The new metal is made under patents controlled by the Titan Co., 1124 Real Estate Trust Building, Philadelphia, Pa., by the Alpha Metals Co., Bellefonte, Pa. This metal is not as corrosive as steel and has a tensile strength, it is claimed, of 75,000 pounds per square inch, making it a substitute for steel in certain places. The metal may be worked hot and can be cast in sand or iron chills and pressed into a die of correct size to produce a finished job. It is suitable for such parts as pinions, bolts, screws, and for bronze-covered iron and steel, etc. The last application is for the purpose of protecting the under metal.

Premo Fan Belt Adjuster

The N. Y. Motor Car Devices Co., 117 East Twenty-fourth street, New York, has brought out the Premo constant-tension fan belt adjuster for Ford cars. This is in the form of a spring with two attachments, which is designed to keep the belt tight at all times. As shown in Fig. 4, the spring is attached at one end to a projection near the water manifold and at the other to the pulley shaft. Price is

50 cents and it may be installed easily in a few minutes.

Rochester Tow Ropes

The Rochester Rope Goods Co., Milwaukee, Wis., is marketing two forms of tow ropes, one made of Manila, and the other of steel cable. The latter is made in 25-foot lengths of ⅜-inch material and both

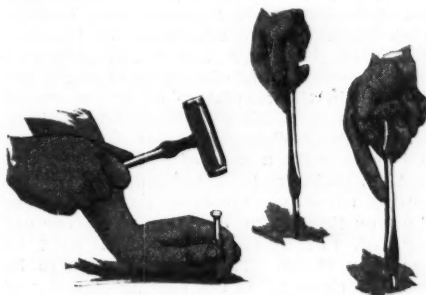


FIG. 6—HAMR-HANDL SCREWDRIVER
This is a combination tool which may be used as a hammer or screwdriver

ends are protected from chafing painted parts of the car. Easily applied buckles are fastened at both ends.

Ford Delivery Bodies

A complete line of commercial bodies for Ford cars is marketed by the Commercial Auto Body Co., St. Louis, Mo. One

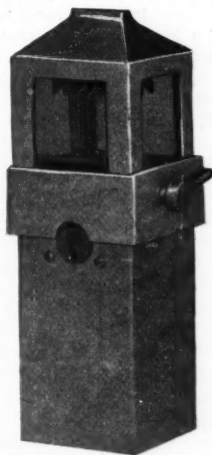


FIG. 7—JITNEY FARE BOX

A type of box used extensively on street cars. It is made of polished aluminum and nickel-plated steel

of the latest models produced is a lightweight, all-steel, panel body, called model 100. This is shown in Fig. 3, and it is 56 inches long, 42 inches wide at the rear and 54 inches high. It lists at \$120. This is an attractive design, with double doors in the rear, solid slated roof, covered with duck, and half-moon bevel-glass windows above the driver's seat. The finish is blood red, with black moulding.

Davis-Boyer Ford Body

A neat and attractive streamline roadster body, with fittings for installation on a Ford chassis, is that just announced by the Davis-Boyer Co., 71 Woodward avenue, Detroit, Mich. The entire outfit consists of a body with top and windshield, radiator, hood, fenders and aprons, lamp bracket extensions and tire holder supporting irons. As transformed, the appearance of the Ford is improved to a great degree, as will be seen from the illustration in Fig. 5.

The body is designed after many of the high-priced jobs on the market and is trimmed with real leather, it is stated. The windshield is of the ventilating type, made of black enamel trimmed in nickel. The top is of khaki and fitted with curtains which fasten to the windshield. The radiator is a V-shaped type, with a rounded nose and the fenders neatly curved. They have a 7-inch crown and are 9 inches wide.

Alemco Chain Attacher

A fitment in the form of a skid chain attacher has been announced by the Alemco Mfg. Co., Newark, N. J. This is in the form of a U-shaped device with a portion at the middle which grips the chain while the attachment is around the tire. With one end of the chain held in place, the other is brought around by running the car ahead a few feet and then this also may be hooked without difficulty. The use of the attacher does away with the inconvenience of trying to fit chains in rainy weather with only the hands to bring the ends together. The price is 50 cents.

Warren Car Stand

A car stand for shop use is announced by Warren & Anderson, 404 Boston block, Minneapolis, Minn., under the name of the Ekern stand. It is made entirely of steel, weighs 11 pounds, and is adjustable to any height from 20 to 37 inches. Price is \$6 per pair for all cars.

U-Can-C Shield

A quick-detachable protector, for glass windshields, which is said to be effective in keeping out rain, is the U-Can-C made by the Frey Mfg. Co., Chicago. The U-Can-C is in the form of visor-shaped piece of transparent substance called Pyralin, which is somewhat like celluloid. This is held in place by five vacuum cups, which are said to hold the shield firmly even in a wind. When not required for use, the shield may be removed quickly, rolled up and placed in the tool box. Price is \$1.50.



From the Four Winds



DALLAS Has 10,150 Motors—Dallas, Tex., has 10,150 motor cars, that being the total registration up to June 15. Numbers 9,999 and 10,000 were sold to the highest bidders, \$126.50 being secured for those two license plates. The fund was given to the baby camp.

Decorates Car with Cherries—Seven hundred and forty-five pounds of cherries were used to cover a Haynes car by A. S. Vager, a San Leandro, Wash., cherry grower, who entered his car in the decorated parade at the Panama exhibition. The entire body of the car was covered with Royal Anne and Black Tartarian cherries, and was a feature of the Alameda county day at the exhibition.

Ford Band to Coast—The seventy-five artists who make up the Ford Motor Co.'s band will start July 18 on a tour to the Pacific coast, the principal object being the Panama-Pacific exposition, where the band is to give concerts during its 10-day stay. Other cities to be serenaded are Los Angeles, Salt Lake City, Denver, Dallas, Houston, El Paso. The tour's expense will be paid by the Ford Motor Co.

Safety Lines for Harrisburg, Pa.—In order to decrease the number of motor car accidents that have recently occurred on the streets in Harrisburg, Pa., Jay lines for pedestrians will be placed at busy street intersections in the central part of the city. The lines will be painted in white and will mark the space to be used by pedestrians when crossing streets. The one will extend across the intersection from the curb line, while the other will connect the building line.

Canadian Demand for Popular-Priced Cars—The Canadian Northern Railway, in reviewing general conditions in Canada regarding the motor car, says that in motor cars there appears to be an undiminished domestic demand for machines of a popular price, but in the case of the more expensive makes, that condition does not prevail. Foreign goods appear to be out of favor, and makers of Canadian cars, accordingly, are optimistic generally regarding the future. The farmer as a class seems to be in the market since last autumn to a greater extent than was formerly the case, and war orders have been a considerable factor.

Motor Statistics in Ohio—There are more motor cars owned in proportion to the population in the rural districts of Ohio than in the big cities. This information is shown by the early returns of district tax assessors to the state tax commission. Complete return from more than 150 different parts of the state show there is not a single township without cars, and the number runs from ten to 265. There is a big increase in the number of cars being returned for taxation this year over last year, and in spite of the reduction in price generally, the returns show an average value of about \$300 placed on these machines.

Wisconsin Prohibits Bird Killing From Motors—One of the novel acts of the present session of the Wisconsin Legislature is the passage of a law prohibiting the killing of game birds from motor cars. The penalty is a fine of \$10 to \$25 or 10 to 30 days in jail. The law is now effective. Wisconsin is a great fishing and hunting state and the practice of shooting game without leaving the comfortable cushions of motor cars has grown to large proportions. During the deer hunting season, November 1 to 20 of each year, many deer are killed in this manner,

but the chances are regarded as too small to make it necessary to regulate the practice by law.

Wisconsin Passes Bridge Law—A law has been passed by the 1915 Legislature giving authority to the owner of any bridge or like span, kept and maintained wholly for public use free of toll or for the use of which toll is charged to fix speed limits and penalties for violating such limits. The limit of speed is not faster than a walk. The owner may sue in his own name and for his own use for any forfeiture incurred by any person violating such notice.

Many Motors at Gettysburg—That the Gettysburg battlefield is realizing the predicted heavy motor traffic for this summer is indicated by the figures of the last week. Records kept by one of the guards on the battlefield show that more than 800 cars passed his beat during that time. These records are not complete as many of the machines cover only a part of the field. It is safe to say that more than 1,000 foreign cars were on the battlefield during the week. At the low average of five passengers to the car more than 5,000 persons viewed the battlefield by this method alone.

Schenectady Uses Thompson Jitney Measure—Schenectady is the first city in New York State to take advantage of the new Thompson jitney law, and it has passed an ordinance putting all the features of the law in force in the regulation of jitneys which have been operating in competition with the Schenectady Railway Co. Schedules of routes and rates, with a map of the former, must be filed, and cars must not carry more than seating capacity. Bonds of as many times \$1,000 as the seating capacity of the car are required, but in no case shall a bond be less than \$5,000. The license fee is to be as many times \$5 as the seating capacity of the car, but not less than \$25 a year.

Motor Volume Helps Get Bank Charter—The incorporators of the Zenith State Bank of Zenith, Kan., were granted a charter recently on testimony of the town's prosperity that consisted chiefly of the showing of motor cars owned and used there. One exhibit was the books of a motor car agency showing that it had sold seventy-three cars in the last 11 months. Another bit of testimony was that nineteen cars were counted in front of one store on a Saturday afternoon. The clinching testimony was that ninety-six farmers had come in their cars to attend a short visit of a Hessian fly special. All that—and a few words about elevators and stores—quickly convinced the board that a bank was a necessity in Zenith.

Chauffeur Sans Arm and Leg—Jean Dodd, a licensed chauffeur, of Grand Rapids, Mich., has but one arm and one leg, yet in his 4 years' driving experience he never has had an accident and is considered one of the best motorists in the city. He lost his right arm and leg by amputation in 1909 after he stumbled and fell against a high-tension electric wire carrying 7,200 volts and was

severely burned. His life was saved by the merest chance, a long pair of linemen's pliers belted to his waist conducted the heavy current from his arm to his leg and averting its passage through his body. Dodd is an excellent mechanic and he spends his spare time building over cars and constructing new ones. The car shown herewith is one of his productions and this unique machine has been driven by him to first place in a number of county fair races.

New York Motor Registrations—The Secretary of the state of New York has issued a statement of the number of registrations of motor vehicles made in that state between February 1 and June 15, which shows 188,953 as against 140,218 for the same period last year.

Motor Cars vs. Family Carriage—From the reports of the tax assessors in Columbus, O., which boasts of 225,000 population, only four of the old-fashioned family carriages were returned for taxation this year. That shows how the motor car industry has made inroads in the carriage building trade and how the motor car has supplanted the old family carriage.

The Cure for Cross-Eyed Headlights—One of the last things done to a Pierce-Arrow car before it leaves the factory is to adjust and focus the headlights. This operation has a great deal to do with the efficiency of the lights. Before focusing, the lamp beams are thrown in all directions, sometimes high, sometimes low, or favoring one side or the other. To standardize the lamp adjustment, Pierce-Arrow engineers invented the range finder now used for this purpose. As the car is on its way to the shipping platform, it is run to a certain position marked out with red lines painted on the floor, and facing a white canvas target. This target is so marked that the range of the different size cars easily is determined.

Common Carrier Ruling in Arizona—Motor cars transporting passengers between Globe and Phoenix, Ariz., by way of the Roosevelt dam, are common carriers, the Arizona corporation commission has decided, and the commission has issued an order prescribing their rates and running time. Cars are divided into two classes, according to weight, with 2,000 pounds as the dividing line. For the heavy cars the round-trip rate is \$25, and for the light cars \$18. Other rates are in proportion. No light car is allowed to make the trip, 115 miles in less than 10 hours, and the heavy machines must use 9 hours. No car shall carry more passengers than the seating capacity rated by the manufacturer.



JEAN DODD, GRAND RAPIDS, MICH., CRIPPLE CHAUFFEUR

Good Roads Activities

Highway Association Changes Name—By an amendment filed in the office of the Kentucky secretary of state recently, the corporate name of the Dixie Central Highway Association, with main office at Bardstown, Ky., has been changed to the Dixie Highway-Shortest Route Association.

Highway Logger Explains Route—Croft Harper, of Atlanta, Ga., who is logging the ocean-to-ocean highway, commonly known as the Dixie Overland highway, that is to run from Savannah, Ga., to Los Angeles, Cal., arrived at San Angelo, Tex., a few days ago. He says that the road he is logging enters Texas near Marshall, runs west to Dallas and Fort Worth, thence to San Angelo. From here the route is south to Del Rio, thence west to El Paso. According to Mr. Harper's statement the road when finished will be dedicated to the memory of Jefferson Davis, former president of the Southern Confederacy.

Osage Valley Highway Dedication Postponed—The formal dedication of the Osage Valley highway connecting Springfield, Mo., with Kansas City, which was to have taken place June 30, has been indefinitely postponed because of the high water in the rivers, and the heavy rains which have damaged the road in some places. The plan for the celebration had as its main feature an excursion over the road, with visits and demonstrations at the important towns on the route, the trip to last a week.

Ruling Increases Road Fund—After a legal mixup between the office of the attorney general and the Ohio highway commission a ruling has been made to advance money into the road fund from other state funds to permit of road improvements which have been awarded. The amount of money transferred was \$215,000 which was necessary to take care of the contracts. The contracts had been awarded under a mistaken impression of the law.

To Improve Old Trails Highway—A campaign has been started by the business men of Dayton, O., for the improvement of what is known as the Old Trails road. The campaign is under the direction of E. J. Hernan, assistant director of the National Highways Association.

Signless Roads in Pennsylvania—Instructions are being sent out to all employees of

the state highway department to destroy all signs along all roads in Pennsylvania. Under a law, which seems almost to have been forgotten, signs of all descriptions legally can not be erected or maintained along any road in the state whether state highway, county or township road. Employees are told to tear down all signs that may be fastened on trees, posts, boulders or fences along the road. Thousands of signs are painted on fences and the instructions are to paint over these.

Coming Motor Events

CONTESTS

- * July 3—300-mile race, Sioux City, Ia.
- * July 3—Hill climb, Oriskany Falls, N. Y.
- * July 4—Road race, Chico, Cal.
- * July 4—Speedway races, Tacoma, Wash.
- * July 5—Road race, Visalia, Cal.
- * July 5—Track meet, Chester, Pa.
- * July 5—Speedway races, Omaha, Neb.
- * July 5—Track meet, Lewiston, Me.
- * July 5—Track meet, Boston (Readville), Mass.
- * July 5—Road race, Tucson, Ariz.
- * July 7-8—Track meet, Taylor, Tex.
- * July 8—100-mile dirt track race, Burlington, Ia.
- * July 31—Speed races, Des Moines, Ia.
- * July 31—Road race, Denver, Colo.
- * July—Track meet, Allentown, Pa.
- * August 13—Track meet, Flemington, N. J.
- * August 14—Dirt track races, Janesville, Wis.
- * August 20-21—Elgin road races, Elgin, Ill.
- * August 21—Track meet, Ellenville, N. Y.
- * August 20—100-mile dirt track race, Kalamazoo, Mich.
- * September 4—Speedway races, Minneapolis, Minn.
- * September 6—Speedway races, Providence, R. I.
- * September 24-25—Track meet, Grand Rapids, Mich.
- * October 2—Speedway races, New York.
- * October 2—100-mile track races, Fresno, Cal.
- * October 2—Speedway races, New York.
- * October 1-2—Track meet, Trenton, N. J.

* Sanctioned by A. A. A.

SHOWS AND CONVENTIONS

- * September 13-15—Pan-American road congress, Oakland, Cal.
- * January 1-8—New York show.
- * January 22-25—Chicago show.
- * March 4-11—Boston show.

With the Motor Clubs

Club Asks Horn Blasts Be Minimized—The Automobile Club of Maryland proves itself thoughtful for other persons. The body has sent out an urgent request for motorists not to blow their horns unnecessarily. The request is as follows: "Inasmuch as a number of residences at this season of the year will have their windows and doors open all during the day and night, street noises naturally will disturb the occupants much more than during the winter season. The operators of motor vehicles are, therefore, warned and earnestly requested to refrain from sounding their horns between 1 hour after sunset and 1 hour before sunrise.

Orphans' Day Observed—The Automobile Club of Minneapolis observed its annual orphans' day June 16. As in previous years, the children were taken direct from the various homes to the country club at Bloomington-on-the-Minnesota. A boy scout crew acted as guides. Louis Koch was chairman of the arrangement committee.

Club Holds Sociability Run—Over 200 members of the Automobile Club, of Hartford, Conn., and invited guests drove in cars to the Springfield country club at West Springfield, Mass., last week. The route was from Hartford to Windsor, Windsor Locks, and Suffield. Dancing followed the dinner. The affair was one of the best ever conducted by the club. Already there is talk of a similar run to some of the other cities within easy distance of Hartford.

Motor Clubs Unite—The Hettinger Automobile Club has been formed from the numerous clubs, including those at Mott, Bentley, Burt, Regent and New England, N. D. Road overseers were appointed and the license tax distribution from the state divided for road work.

Danger Spots to Be Marked—The Montreal Automobile Trade Association has received the first consignment of 200 danger signs. These will be placed on the roads of the Island of Montreal. It is the intention of the association manager, T. C. Kirby, to place at least 1,000 of these signs during the coming season. Special attention will be given to sharp turns and dangerous hills and crossings. The approaches to schools will also be plainly marked as dangerous, and it is with confidence that this danger-sign placing program is being promoted.

Canton, O.—Belden Motor Car Co., to operate a sales agency and garage; capital stock \$10,000; incorporators, C. W. Belden, B. S. Belden, E. E. Smith, C. A. Crane, J. T. Blake.

Detroit, Mich.—Erskine-Campbell Corp.; capital stock, \$50,000; to deal in automobiles, parts and accessories; incorporators, Wilfred J. Campbell and James E. Erskine, Detroit; Philip N. Manguy, Walkerville, Ont.

Jefferson City, Mo.—United States Automobile Fire Alarm Co.; capital stock \$500,000; incorporators, L. N. Thomas, J. T. Duff and J. M. Johnson.

Jefferson, City, Mo.—Chamberlain Goodloe Motor Co.; capital stock \$2,000; incorporators, R. F. Chamberlain, F. P. Goodloe and F. E. King.

New York—Brautigam Taxi Co., motor car livery business; capital stock, \$3,500; incorporators, Emilie Brautigam, Richard Froehlich, S. Rubin.

New York—Falls Tire Co., to manufacture tires, and rubber goods; capital stock, \$15,000; incorporators, Henry Weiss, Marcella Sanger, Agnes G. Sanger.

New York—Forty-eighth Street Garage, garage business; capital stock, \$5,000; incorporators, Morris Bonsole, Michael M. Bonsole and Max Bonsole.

New York—Miller Centrifugal Motor Co., to manufacture motors, etc.; capital stock, \$800,000; incorporators, Martin Lippman, Emanuel L. Meyer and Emma Ullman.

New York—Motor Kart Mfg. Co., to manufacture, sell and deal in and with motor cars and all accessories thereto; capital stock, \$500,000; incorporators, Alfred R. Gormley, E. M. Moore, H. J. Sweetson.

New York—Phillips Auto Seat Co., to design and manufacture seats and covers for motor cars; capital stock, \$5,000; incorporators, Norman M. Lynn, Christine A. Phillips and Frederick A. Phillips.

New York—Reliable Touring Car Service; capital stock, \$10,000; incorporators, Charles L. Delehanty, Harry McGenigle and William F. Byrnes.

Recent Incorporations

New York—Roller Lock Nut Co., to manufacture Wegener roller lock nut, etc.; capital stock, \$900,000; incorporators, B. J. Greene, A. H. Wegener, and H. L. C. Menk.

New York—Samot Taxi Cab Co., general taxicab service; capital stock, \$1,000; incorporators, Matthew J. Larkin, August W. Heitel, Richard E. Weldon.

New York—Yorkville Auto Supply Depot; capital stock, \$10,000; incorporators, Michael Walpin, Frieda Richman and Sydney Richman.

Pontiac, Mich.—Pontiac Chassis Co., to manufacture motor car chassis, parts and accessories; capital stock, \$100,000; incorporators, R. A. Palmer, E. P. Waldron and M. D. Hubbard.

Providence, R. I.—Compartment Garage Co.; capital stock, \$15,000; incorporators, Frederick L. Pierce, Almon C. Burnham and Arthur Sellow.

Racine, Wis.—Wisconsin Auto Top Co., to manufacture motor car tops, covers, cushions, etc.; capital stock \$15,000; incorporators, Edward P. McAvoy, Charles V. McAvoy and Alice M. McAvoy.

Schenectady, N. Y.—Dworkowitz Garage, Inc., of Schenectady, motor car garage; capital stock, \$800; incorporators, David Dworkowitz, Abe Dworkowitz and Annie Dworkowitz.

Toledo, O.—Meyer Auto Repair Co., to operate a garage and repair shop; capital stock, \$2,000; incorporators, Carl Meyer, C. O. Que-

ichke, E. J. Beeman, George F. Hahn and T. Wooster.

Toronto, Ont., Can.—Automobile Signal System Co.

Toronto, Ont.—Buckeye Tire Co. of Canada, Ltd.

Toronto, Ont.—Toronto Jitney Association, Ltd.

Trenton, N. J.—Morrestown Motor Co., general motor car business; capital stock \$125,000.

Troy, N. Y.—Troy Auto Car Co., general motor car business; capital stock \$35,000; incorporators, Louis W. Schupp, Jean E. Schupp, George A. Vanderblit.

Walkerville, Ont.—Acason Motor Truck Co., Ltd.; capital stock \$40,000; incorporators, H. W. Acason, W. Critzer, Edith L. Acason.

Yonkers, N. Y.—Mitchell Shop, Inc., motor car repairs; capital stock \$1,000; incorporators, Edward F. Germain, Wilfred E. Willis and David Morris.

New York—Republic Motor Sales Co.; capital stock, \$15,000; incorporators, S. Wall, J. Pendleton, I. Elsner.

New York—Wilcox Taylor Auto Co.; capital stock, \$1,000; incorporators, W. H. Wilcox, Wm. H. Wilcox, J. J. Taylor.

Brooklyn, N. Y.—Fox Accessories Co., to deal in motor car accessories; capital stock, \$15,000; incorporators, A. M. Eddy, G. E. Eddy, A. S. Hart.

New York—Thedford Transportation Co.; capital stock, \$5,000; incorporators, R. Thedford, G. Glynn, J. Farber.

Barker, N. Y.—Barker Oil Co., to deal in lubricating oils, greases, etc.; capital stock, \$2,000; incorporators, A. J. Todkill, J. E. Morgan, A. J. McAdam.

Danbury, Conn.—Danbury Taxicab Co.; capital stock, \$2,000; incorporators, J. N. Riley, P. J. Martin, A. Demond.

New York—Arenia Automobile Co.; capital stock, \$3,000; incorporators, J. Ballenberg, O. Ballenberg, J. Ballenberg.

Rochester, N. Y.—Alpha Motor Car Co.; capital stock, \$16,000; incorporators, L. K. Opdyke Jr., H. F. Hughes, F. L. Hughes.



Among the Makers and Dealers



BUICK to Make 75,000 Cars in 1916—Instead of 60,000 Buick cars, as has been reported, the Buick Motor Co. has decided to make at least 75,000 cars next season.

Partnership Is Dissolved—The Carpenter and Cummings Automobile Co., of Columbus, O., has been reorganized by the withdrawal of Peter Cummings and the purchase of his interests by Claude V. Carpenter, who is sole owner. Peter Cummings has opened a repair shop.

Milwaukee Accessory Manufacturer Moves—The Auto Parts Mfg. Co., Milwaukee, Wis., a large manufacturer of windshields, bumpers, shock absorbers and other accessories and devices, has moved from the Stroh Industrial Building to new and larger quarters occupying the entire second floor of the recently enlarged Milwaukee branch house of the Mitchell Automobile Co.

Kisselkar Trucks for Serbia—Eighty Kisselkar trucks left the factory of the Kissel Motor Car Co., in one trainload last week. The entire train was made up of flat cars, two trucks being loaded on each car. The shipment was consigned to the government of Serbia and consisted of thirty ambulances and fifty heavy service vehicles for commissary use.

Body Equipment Concern Incorporated—The Wisconsin Auto Top Co. has been incorporated at Racine, Wis., to succeed to the partnership business, conducted by the heirs of the late C. E. McAvoy. The new company has a capital stock of \$15,000 and the incorporators are Alice, Edward and Charles McAvoy. The plant manufactures tops, seat covers, cushions, covers and other trimming goods and devices for the motor car trade.

Joplin Gets Third Mechanical Depot—The Goodrich Rubber Co. has established its third mechanical depot branch, at Joplin, Mo., putting that city in the class, for distribution purposes, with Birmingham, Ala., and Norfolk, Va. N. B. Finney, formerly of Denver, Colo., will have charge of the sales work in the district, and has moved his family there. John W. Pratt was transferred from Buffalo, N. Y., to take charge of the local branch. The middle west and southern states will be supplied from this branch.

Asks Court Disposal Instructions—Howard C. Park, receiver for the Dunlap Mfg. Co., of Columbus, O., formerly manufacturer of parts, has asked the court for instructions as to the disposal of the plant. The property was appraised at \$42,505 and an offer of \$40,000 for the plant and fixtures has been received. Some time ago the receiver was approached by representatives of warring nations for the plant to be turned into a shell factory. This would have occasioned an expenditure of \$10,000 which was objected to by some of the creditors.

Oakland Sales Personnel Changes—Several important promotions have been made among the officers of the Oakland Motor Co., Pontiac, Mich., by President Charles H. Nash, of the General Motor Co., of which the Oakland company is a subsidiary concern. Fred W. Warner, who has been general sales manager is now general manager; C. B. Voorheis, who was assistant sales manager becomes general sales manager and Thomas H. McDearmon, of the department is made assistant general sales manager. Mr. Warner formerly was manager of the Buick Motor Co.'s branch in Chicago; Mr. Voorheis was general manager of the Kingman Plow Co., Peoria, Ill.; Mr. McDearmon was gen-

eral sales manager and assistant general manager of the John Deere Plow Co., Kansas City.

Franklin Factory to Expand—The Franklin Automobile Co., Syracuse, N. Y., is to erect two buildings which will represent an investment of \$100,000 including machinery and equipment. This addition to the plant was brake, A. Dunford and Charles E. Ross.

May Add Kelly-Springfield Plant—The Kelly-Springfield Tire Co. of Akron, O., seriously is considering a further enlargement of the plant there. The works are now running on a 24-hour schedule and are being rushed with orders. The output recently has run up as high as 1,100 tires a day.

New Truck Company in Seattle—The Seattle Truck Co. is the latest to enter the Seattle field, headed by H. N. Rothweiler, with service department located at Broadway and Denny Way. The motor and transmission are standard Ford products on the new truck with a Wright Timken attachment.

Columbus Factory to be Opened—The Eureka Mechanical Starter Co., of Columbus, O., which was incorporated some time ago with an authorized capital of \$30,000, soon will open a factory in Columbus for the manufacture of a starter, which has been patented. W. A. Ross is the practical man in charge of the project. The other incorporators are J. W. Matthews, C. E. Bone-

New Four-Wheel Drive Truck—N. C. Miller, president and general manager of the N. C. Miller Mfg. Co., Dodgeville, Wis., is planning to engage in the production of motor trucks, having been granted letters patent on a new type of four-wheel drive. Mr. Miller has been working on the invention for 5 years or more. The present Miller plant will be used until the business demands larger works.

Makes Jitney Bus Body—The Grand Wagon Co., of Kansas City, Mo., has yielded to the pressure of opportunity, and has made a jitney bus body. It is a 12-passenger bus, on a Locomobile chassis, and will be put into service by Morris Aaron, brother of Michael Aaron, one of the proprietors of the wagon company. If the experience of the bus is favorable, other jitneys probably will be made and put into the service. The body is somewhat on the style of the Studebaker buses now on the Kansas City streets.

Engine Company Building Testing Shop—The Falls Motor Co., Sheboygan Falls, Wis., manufacturers of gasoline engines for motor cars, is about to erect a large new testing shop building, due to the crowding of the present works by an unprecedented demand for Falls motors. The new shops will be of brick and steel, 45 by 154 feet, with concrete floors. The present testing shop is being equipped with machinery for motor construction. Overtime operations have been in effect for some months and the plant is employing more men than at any time since its establishment.

To Standardize Ford Sociological Work—Sociological department staff members from the branches of the Ford Motor Co., in Chicago, Cleveland, Columbus, Cambridge, Buffalo, Pittsburg, Philadelphia and Long Island, met at the main plant in Detroit last week. They brought the records concerning the men in their respective branches and discussed with the local sociological heads matters concerning the department. There will be two other meetings at which the heads from other branches will come to give

their statistics. The object of these meetings is to bring about uniform methods in the sociological work of the Ford Motor Co., through all its branches.

Princess Motor Leases Saxon Plant—The Princess Motor Car Co., of Detroit, Mich., which was organized in June, 1914, and which has been located at 348 Clay avenue, has leased the former plant of the Saxon Motor Co. on Bellevue avenue, and shortly will move to it.

New Home For Cadillac In Minneapolis—The Northwestern Cadillac Co., has leased 55 feet of frontage at 23 Ninth Street S., Minneapolis, for a new building for its business. The rate is \$836 a front foot for the first 5 years, \$1,032 for 10 years and \$1,200 for the remainder of the 99-year period. The building will be a one-story concrete.

Powers Gas Products Reorganized—The Power Gas Products Co., capitalized at \$125,000, has been reorganized. A branch automobile chemicals. Officers are: President, S. A. Stockwell; vice president, E. H. Sherwin; secretary, C. F. Heberle; treasurer, J. S. Calder; directors, T. O. Ofstum of Glenwood, Minn.; A. J. Edwards, and George Wollman, salesmanager at Detroit.

Drive-Away Day for Saxons—The Saxon Motor Co., of Detroit, Mich., has promoted a drive-away day for dealers to be held July 15. Saxon sixes exclusively will be driven away. To make the event more interesting a silver loving cup will be given to the dealer who, in driving home, makes at least 100 miles and consumes the smallest amount of gasoline and oil. Speed will not be considered.

Buy Chester Tire and Tube Plant—The Kansas City Tire and Rubber Co., recently incorporated in New York State by P. E. Werner of Akron, O., W. W. Wachter and Philip Freshwater, has purchased the Chester Rubber Tire and Tube Co. plant in Chester, W. Va., as part of the above \$2,000,000 incorporation. The Chester plant will be enlarged and its capacity doubled by the new management, and will supply the eastern tire and rubber products trade, while another plant, recently purchased by the company in Kansas City, will supply the central district.

Canadian Plant for Chevrolet—It is authoritatively stated that the interests connected with the Chevrolet Motor Co., of New York, in the very near future will establish a plant at Toronto, Ont., for the manufacture of Chevrolet cars. The plant will have a capacity of 5,000 motor cars per annum, and will supply some of the British colonies as well as the Canadian trade. The car to be manufactured is known as the Chevrolet 94, a five-passenger touring car, selling in the United States at \$490. The price to the Canadian trade will be in the neighborhood of \$590.

Missouri Tire Factory Closed—It is reported from Springfield, Mo., that the factory of the Airplex Inner Tire Mfg. Co. has been closed. The company was promoted by Arthur F. Smith and other Springfield men, to make a tire that would be more nearly puncture proof than the ordinary pneumatic tire. It was announced that the patent was not the subject of doubt, but that a more opportune time for the manufacture and distribution of the product would be awaited before resumption of activities. The rooms of the company have been leased by C. T. Weatherell, who has organized a cooperative delivery system.



Brief Business Announcements



NEW YORK—A. T. Stanton, Dodge Bros. newly appointed district representative for the British Isles, recently sailed on the steamer St. Paul. Mr. Stanton will have his headquarters in London.

Battle Creek, Mich.—H. E. Petrie, who in addition of conducting the business of the Independent Garage, makes foot accelerators for Ford cars, has received an order for 70,000 accelerators from the New Era Spring & Specialty Co., of Detroit.

St. Louis, Mo.—A. L. Ellwood, formerly Locomobile manager here, has been appointed manager of the Marmon Kansas City branch. His territory will include all Kansas, western Missouri, Oklahoma, southern Nebraska and southern Iowa.

St. Louis, Mo.—F. H. Rengers has been made assistant to J. W. Moon, president of the Moon Motor Car Co., and has taken charge of the correspondence department and office work of an assistant nature to J. W. Moon. He succeeds C. C. Culbertson.

Detroit, Mich.—H. W. Miller, formerly with the Studebaker Corp., the Lozier Motor Co., and the Maxwell Motor Co., has been appointed assistant to Sales Manager Paul Smith. He was with the latter at the Lozier company where he has charge of the service department.

Beaver Dam, Wis.—The Klipper Mfg. Co. has been organized at Beaver Dam, Wis., by R. P. Scholz and N. Schweiger to take over the business of the E. O. Siedschlag Co., manufacturing various articles in brass, bronze and aluminum. E. O. Siedschlag has sold his entire interest to Messrs. Scholz and Schweiger and will retire.

New York—Samuel S. Toback, president of the A. Elliott Ranney Co., formerly distributor for Hudson cars in this city, has closed a contract for the distribution of the King car in this district. The A. Elliott Ranney Co. has moved into the building occupied by the King in the past. Mr. Toback takes with him the same organization that

has been with him during the last 5 years, with C. G. Taylor as sales manager.

Moline, Ill.—Ray R. Bush, who has been sales manager for the Velle Motor Vehicle Co. since last August, and who later was promoted to general manager in addition to other duties, has resigned and will engage in the motor car business for himself at Kansas City, Mo.

New York—George H. Robertson, prominent in the motor industry as a race driver, and later connected with the Auto Supply Co. here, has become the eastern district manager for the Houk Mfg. Co., Buffalo, N. Y. His headquarters will be at the company's branch at Fifty-eighth street and Broadway.

Pittsburgh, Pa.—W. V. Peck, former Chicago representative of the Pittsburgh Model Engine Co., has resigned and hereafter the sales in Chicago and vicinity will be handled direct from the Pittsburgh office. This is in line with the company's desire to give its old and prospective customers the best service possible.

Kansas City, Mo.—E. W. Arrasmith, formerly in charge of the retail department of the Oakland Motor Co. of Kansas City, has organized the Kansas City Oakland Automobile Co., which will have the retail business of the Oakland car here. The Oakland Motor Co. will do only a wholesale business. The headquarters of both will continue as heretofore at 1521-23 McGee street.

Detroit, Mich.—The Chalmers Motor Co. has promoted C. Snyder to the position of superintendent of manufacturing. He has been connected with the Chalmers company for 6 years, and associated with Hugh Chalmers for 14 years. Previous to his coming to Detroit, Mr. Snyder was efficiency man for the National Cash Register Co., of Dayton, O. His work with the Chalmers Motor Co., prior to his new appointment, was along efficiency lines. In his new capacity, Mr. Snyder will have complete charge of the

manufacture of all parts from the rough stock to the finished car.

St. Louis, Mo.—William O. Hardin July 1 will become secretary of the Automobile Dealers' and Manufacturers' Association succeeding Paul J. Fisher. Mr. Hardin comes to the motor car field from the packing industry.

Manitowoc, Wis.—The Aluminum Specialties Co., Manitowoc, Wis., has purchased the business, equipment, stock and materials of the Mauston Aluminum Co., Mauston, Wis., and will consolidate the works at Manitowoc. The Mauston company was formed 3 years ago and now retires from business.

Milwaukee, Wis.—The Graper & Paulus Welding Co. has retired from business and the partnership between Frank E. Graper and Wenzel Paulus has been dissolved. The concern was a pioneer in Milwaukee in the welding, cutting, lamp and radiator and fender repair business. Practically all of its trade was in the motor car trade.

Portland, Me.—Frank E. Wentworth, who is a partner of the Wentworth-Fosdick Co., Hupmobile distributor in Boston, and who has several other motor concerns in New England, has bought out the Overland branch here and in future it will be known as the F. E. Wentworth Corp. He has placed the agency in charge of E. A. Smith, who had charge of the Overland agency at Manchester, N. H., for some years.

St. Joseph, Mo.—J. H. Van Brunt and Vic Malmfeldt retire July 1 from the Maxwell-Hudson Motor Co., organized by them here in April, 1914. The business, which has had a healthy growth from the beginning, has been purchased by A. B. Swift and W. F. Siegmund, of Kansas City, and in future will be known as the St. Joseph Automobile Co.

St. Louis, Mo.—J. L. Bergs, formerly Illinois territory representative of the Studebaker Corp., has been placed in charge of the commercial car sales of the St. Louis branch of the Studebaker Corp.

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Accomac, Va.	A. M. Mason	King
Argyle, Wis.	Nelson & Sweeney	Hudson
Bardgate, Ia.	E. H. Avery	King
Baltimore, Md.	Slayman & Co.	Ailen
Baraboo, Wis.	Gem City Auto Co.	Hudson
Bessemer, Mich.	E. H. Ekman	Hudson
Corwith, Ia.	Frank Bunting	King
Clarion, Ia.	C. L. Speight	King
Cape Charles, Va.	Capt. Thos. Parsons	King
Cambridge, Md.	United Stores Co.	King
Cavalier, N. D.	H. A. Rygh	King
Canal Dover, O.	S. Toomey Co.	Hudson
Chassell, Mich.	Edwin E. Warner	Hudson
Clinton, Wis.	J. Terwilliger & Son	King
Clinton, Wis.	J. Terwilliger & Son	Buick
Columbus, Wis.	Holtz & Logan	Hudson
Dodge Center, Minn.	W. H. Martin	King
Delavan, Wis.	Delavan Lake Boat & Eng. Co.	Hudson
Denmark, Wis.	Kriwanek Bros.	Hudson
Eagle River, Mich.	R. L. Blight	Hudson
Escanaba, Mich.	Holmgren Auto Co.	Hudson
Findlay, O.	Kirk & Flaminio	Oakland
Fergus Falls, Minn.	Fergus Iron Wks. Co.	King
Fond du Lac, Wis.	Louis A. Voell	Hudson
Gowrie, Ia.	Gowrie Auto Sales Co.	King
Gordon, O.	F. G. Feitshaus	King
Granite Falls, Minn.	A. W. Winter	King
Gladstone, Mich.	Holmgren Auto Co.	Hudson
Green Bay, Wis.	C. A. Jones	Hudson

Town	Agent	Make
Green Bay, Wis.	De Bols-Haeyers Co.	Oldsmobile
Humboldt, Ia.	O. V. Lovern Auto Co.	King
Hartford, Wis.	C. F. Wittig & Co.	Hudson
Iron River, Mich.	Lindwall & Lindstrom	Hudson
Jewell, Ia.	Iver Iverson	King
Janesville, Wis.	Hilton Garage	Hudson
Kenosha, Wis.	W. M. Curtiss & Sons	Oldsmobile
Kenosha, Wis.	W. M. Curtiss & Sons	Chevrolet
Lanyon, Ia.	Peterson Auto Co.	King
LaCrosse, Wis.	Law Auto Co.	Hudson
Livingston, Wis.	A. T. Spang Auto Co.	Hudson
Martinsburg, W. Va.	Berkeley Garage	King
Madison, Wis.	Ritter Auto Co.	Hudson
Manitowoc, Wis.	Dicke Motor Car Co.	Hudson
Menominee, Mich.	Auto Service Co.	Hudson
Monroe, Wis.	Geiger, Faeser & Lynch	Hudson
Manistee, Mich.	L. Yalomstein	Hudson
Marquette, Mich.	Superior Garage, Ltd.	Hudson
Mt. Horeb, Wis.	Mt. Horeb Auto Co.	Hudson
New York, N. Y.	A. Elliott Ranney Co.	King
Niles, O.	C. P. Flanagan	Auburn
Phoenix, Ariz.	Paterson's Garage	Oakland
Paso Robles, Cal.	George Bell	Metz
Rockville, Md.	Rockville Garage	King
Richland Center, Wis.	Grant Ross	Hudson
Riverside, Cal.	Roy Stewart	Chevrolet
Rochester, N. Y.	Alpha Motor Car Co.	Auburn

Town	Agent	Make
Sheffield, Ia.	Clark & Knoll	King
Salisbury, Md.	Salisbury Motor Co.	King
Santa Barbara, Cal.	Bartlett Bros.	Chevrolet
Santa Monica, Cal.	Roy Biddlecom	Chevrolet
Santa Ana, Cal.	Waffle & West	Chevrolet
Sault Ste. Marie, Mich.	Soo Hardware Co.	Hudson
Sheboygan, Wis.	Sheboygan Auto & Supply Co.	Hudson
Shullsburg, Wis.	J. J. Jamieson	Hudson
Steuenville, O.	Edgar C. Bower	Chandler
St. Louis, Mo.	J. W. Leigh	Studebaker
St. Louis, Mo.	F. J. Koehler	Halladay
Sturgeon Bay, Wis.	The Sawyer Garage	Overland
Sturgeon Bay, Wis.	The Sawyer Garage	Chevrolet
Ventura County, Cal.	Bartlett Bros.	Chevrolet
Williamsburg, Va.	John A. Bechtel	King
Wellsburg, W. Va.	Gamble & Carman	King
Washington, D. C.	Miller Bros.	Mitchell
Washington, D. C.	Smith-Trew Motor Co.	Oakland
Washington, D. C.	Smith Motor Sales Co.	Briscoe
Washington, D. C.	Capital Auto Service Co.	Regal
Washington, D. C.	H. A. Rhine & Co.	Sphinx
Waterford, Wis.	J. W. Peters	Hudson
Waupun, Wis.	Ed. Van Loo	Hudson
Wausau, Wis.	Morgan Bros. & Krueger	Hudson
West Newton, Pa.	Charles S. Rouse	Auburn
Whitewater, Wis.	Mason & Kraplin	Hudson
Wonewoc, Wis.	Gale & Herrewig	Hudson



The Motor Car Repair Shop



FRICTION between the leather face of the cone clutch and the metal mating portion of the flywheel, in conjunction with the tension of the spring holding the two parts together, forms the driving connection between the motor and the final drive, and it is obvious that if the contact surface between cone and flywheel is not rough enough so that there is sufficient friction, there will be slipping of the clutch. This means that the engine runs faster than it should to give a certain speed to the rest of the driving mechanism.

If the leather facing becomes worn down to a smooth surface, or if it gets hard and dry through misuse, there is bound to be a more or less poor driving contact, regardless of the clutch spring tension, and as this grows more serious, it becomes more difficult to get any speed out of the car because the power to be delivered more quickly overcomes the friction between the metal and leather contact surfaces.

A car with a badly slipping clutch has its greatest difficulty in getting over hills and through stretches of road where the pull is heavy. Therefore, it is not only detrimental to the clutch itself to allow the slipping to go on uncared for, but it makes it more difficult to drive the car and harder on the engine and general mechanism.

It is not a very difficult thing to treat the leather facing so that it will perform its function properly. Usually a small quantity of neatsfoot oil spread over the leather will soften it so as to make it a smooth-running affair, though if the leather is quite hard and dry, it is best to go into the matter further.

As there is very little room between the face of the clutch and the flywheel, it is hard to get a very thick tool between. So it has often been found expedient to take a small saw and carefully run this around the leather surface, roughing it up with the saw teeth. This can be done, as shown in Fig. 1, and is a very handy way to go about the trouble.

It is best to apply the neatsfoot oil before using the saw blade, letting the latter stand on the leather over night, say. This will do what softening it can, when the more severe treatment with the saw will be more easily done. Care should be taken not to unduly tear the leather surface, but simply to loosen up the leather which has been so tightly matted down.

It also is advisable to hold the clutch leather away from the metal surface of the flywheel when it is undergoing treatment with the oil. To do this, the easiest way is to place a stick between the clutch pedal and the heel board of the front seat, holding the pedal down just as if pressed by the foot. Fig. 2 shows this. This allows the oil to soak into the leather without

The Proper Care of Clutches

being squeezed out by the force with which the leather is held against the metal by the clutch spring.

A stiff brush also is a good thing to liven up the leather surface of a bad clutch, but it is next to impossible to get it in between the mating parts of a clutch. Of course, if the cone is disassembled, a brush can be used very expeditiously.

Often a clutch will slip because oil or grease has gotten on the leather. This can be remedied by applying a small quantity of Fuller's earth, evenly distributed over

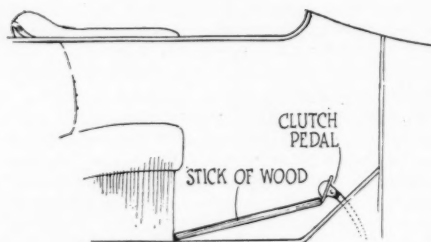


FIG. 2—HOLDING CLUTCH OUT TO OIL THE LEATHER

the leather. This does away with the slipperiness caused by the oil, and restores the friction quality.

In driving, the operator often is the cause of premature wearing of a cone clutch leather. Many drivers have a habit of keeping the foot constantly on the clutch pedal, and too frequently slipping it in place of using the throttle control. This wears the leather surface, and also soon heats the leather through the constant rubbing until it gets hard and dry. It is best to have the foot rest on the clutch ready for instant action, but without exerting any pressure when running along under normal conditions.

Care of Disk Clutch

Many disk clutches, which consist of a series of disk plates attached to the motor shaft, and between each of these a plate

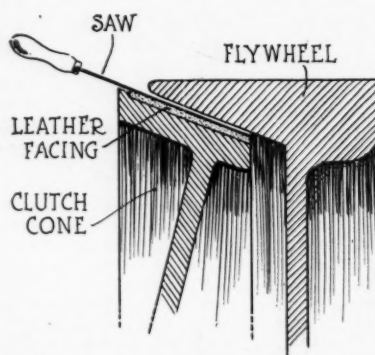


FIG. 1—HOW CLUTCH LEATHER MAY BE ROUGHENED WITH A SAW

attached to the driven shaft, run in a bath of oil, and when transmitting power, are held into engagement with one another through the use of springs. This oil bath prevents any appreciable wear between the driving and driven plates—providing, of course, the engagement springs hold them close enough for slip prevention.

In a form of disk clutch much used, the driven plates are drilled to receive a number of cork inserts around the circumference of each plate. These cork pieces are pressed into holes in the plate, and are specially prepared to be pliable, and to present an absolutely flat surface to bear against the adjacent disks. They absorb the oil, and make for easy engagement.

If a clutch of this conventional disk type slips, it may be that the tension springs are not properly adjusted. Some clutches are provided with means for turning up the nuts holding the springs, thus varying the tension. However, this adjustment usually is deemed so rarely necessary, that many makers do not provide any such adjustment, but rather direct that should the tension have to be increased, metal shims or washers can be placed at the back of the spring, using enough to get the desired tension. Ordinarily, however, any adjustment of this kind should best be entrusted to an experienced repair man, or to a service man.

Before preparing corks for such use, they should be as dry as possible, so that grinding them down to a smooth face will not be a hard matter. A wet cork is apt to tear off in small particles, instead of grinding down, as required, with only fine dust coming off. In doing the smoothing, only very fine emery cloth or sand paper should be used, or better still, a thin coating of some abrasive powder. Naturally, these cork inserts should be pressed into the plates very tightly, and either a bench vise or a small arbor press can be brought into service.

Ordinarily a properly-designed disk clutch needs little attention, and if the proper kind of lubricant is used, and cleaning is done occasionally—some makers recommend a flushing out with gasoline or kerosene every 1,000 miles.

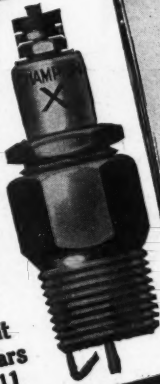
After such treatment, it usually is recommended that an oil lighter than engine oil be applied to a level such that only the lower portion of the plates is submerged. There are on the market several oils specially for clutches of this type, but a medium grade of cylinder oil to which kerosene is added in the proportion of about 1 to 1 usually works most satisfactorily. A heavy oil would gum up the plates, and also prevent positive engagement between them, as it would have to be squeezed out before they could make a firm contact.



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We furnish a specially designed Champion Plug for each motor design—Ford, Overland, Buick, Studebaker, Maxwell and over sixty others.

We subject each separate Champion plug to every conceivable test in the motor for which it is intended.

Each is exhaustively tried out under racing conditions. It is given rigorous tests at the highest speeds under every conceivable load.

It receives test after test until we know positively that it will stand up perfectly under the greatest stress.

This is the process that develops Champion Reliability. This explains why we are able to back Champion Spark Plugs with an out-and-out guarantee.

Champion Guarantee

Complete satisfaction to the user—
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Motorists, almost universally, demand Champions. These plugs sell themselves. Many successful dealers handle them to the exclusion of all others. Make your line a Champion line. Write us today.

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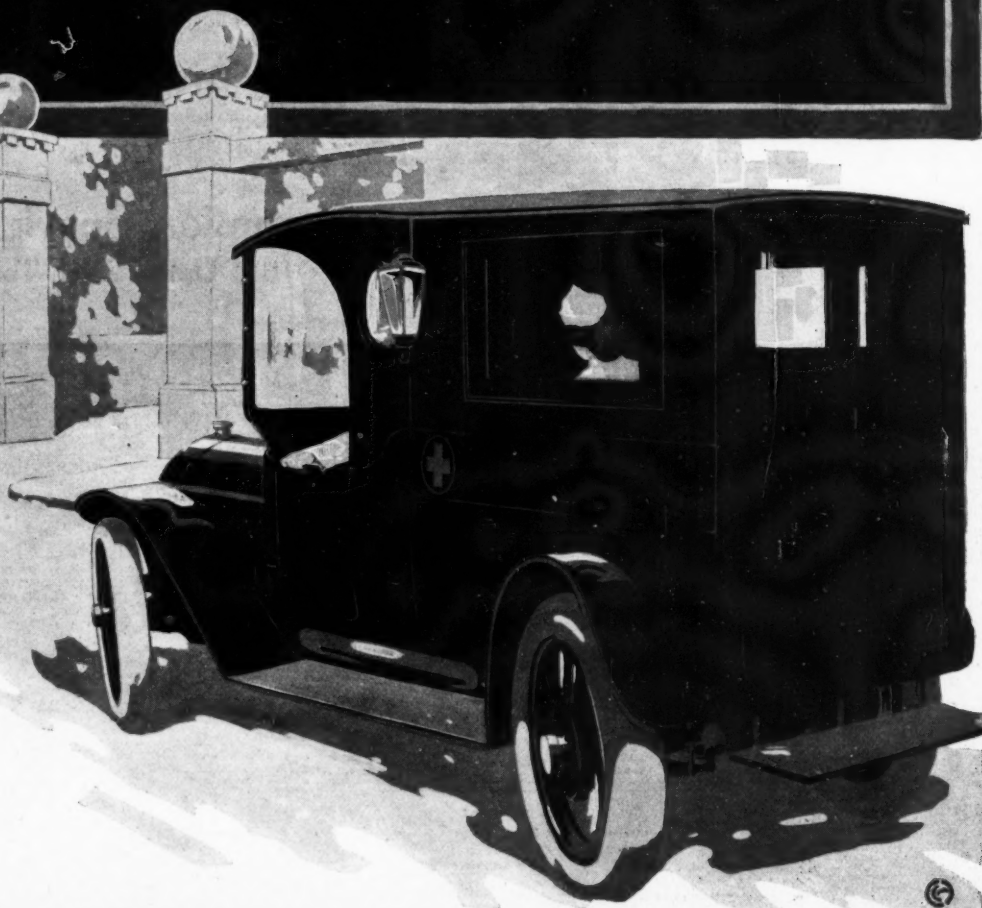
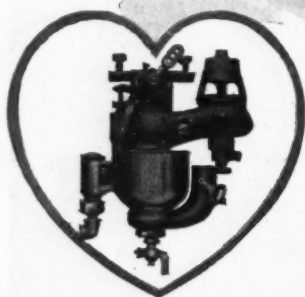
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Proud as SCHEBLER is of the world's records it holds for power, economy, flexibility and endurance, the SCHEBLER standard is topped by **DEPENDABILITY**.

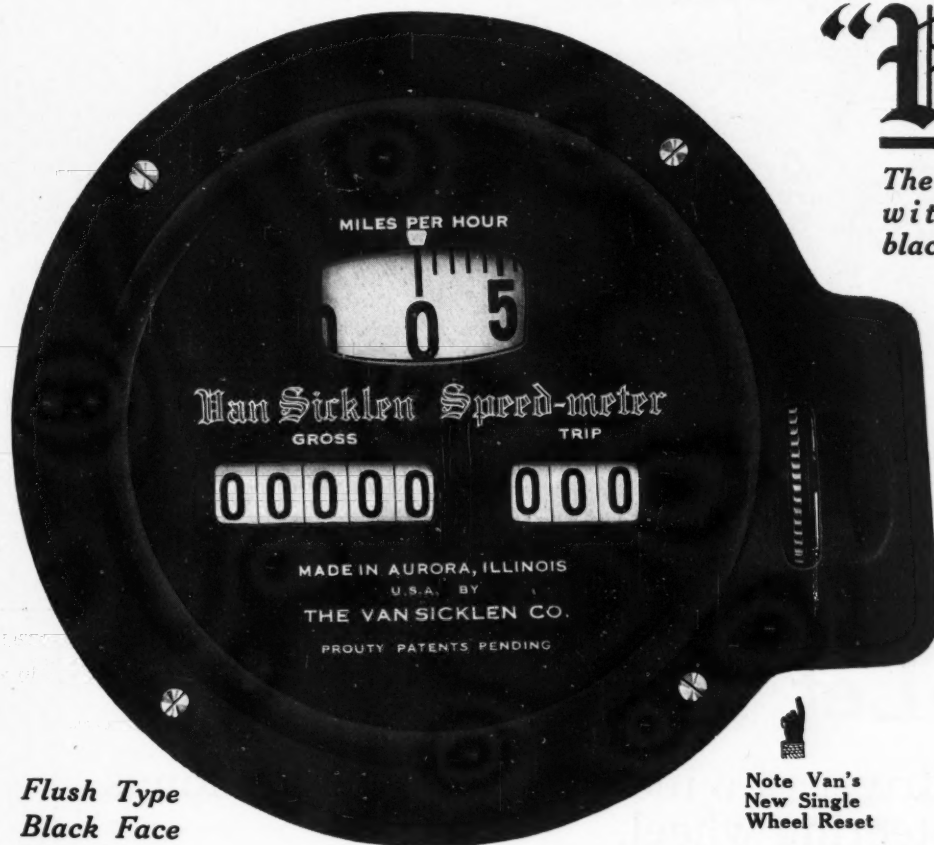
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*Flush Type
Black Face
Actual Size*

*Note Van's
New Single
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¶ Though Van's only a little over a year old, he is already standard equipment on some of America's best cars.

¶ Engineers claim Van's pneumatic principle of operation to be the ultimate in speedometer construction.

¶ Van is simple—trouble-proof—guaranteed. He is legible even to passengers in the back seat—non-fluctuating — reflection-proof — noiseless.

¶ Van's single wheel reset, free from locking devices, is an exclusive feature. Write for full details.

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General Distributors: The Beckley-Ralston Company, Chicago

Foreign Distributors: Mestre & Blatge, 20 Store St., Tottenham Ct. Rd. W. C., London, England



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The driver of a modern motor car belongs at the steering wheel.

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It's merely a matter of pushing a button and hearing a hum—and there will always be action when your Willard is properly cared for. If you don't understand its care, go around to the nearest Willard Service Station. Advice is free, repairs are expert, and you'll be glad you acted on the suggestion.

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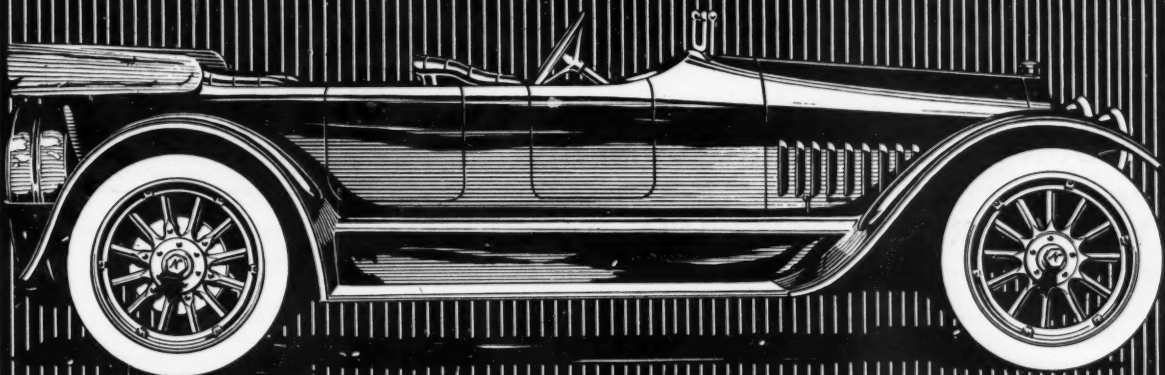
WHAT'S IN A NAME?

THE name "Highway" tells the whole story. This year is an outdoor year—a year of living on the Highways, which means living in motor cars. The best way to live on the road is to ride in these new *Nationals*. All of the "good" of *National's* racing success is concentrated in these new cars, giving them the power, the endurance and the "go" that makes them America's Highway Champion. Dealers, the minute they

heard the attractive *National* prices, wired their orders, having enough faith in the *National* reputation to know that whatever bears the name of *National* is worthy of their confidence. Many of these new cars have been bought "sight unseen" and invariably, whenever dealers have seen, inspected and ridden in these new cars, their enthusiasm has been unprecedented. The demand for these cars is so great that our capacity is going to be taxed, but we will not build a single car more than we can according to the high standard of *National* quality. Detailed information of the six and twelve cylinder cars sent on request.

National Motor Vehicle Co., Indianapolis, U. S. A.

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If Your Car "Rides Hard"--- When Your Spring Breaks---

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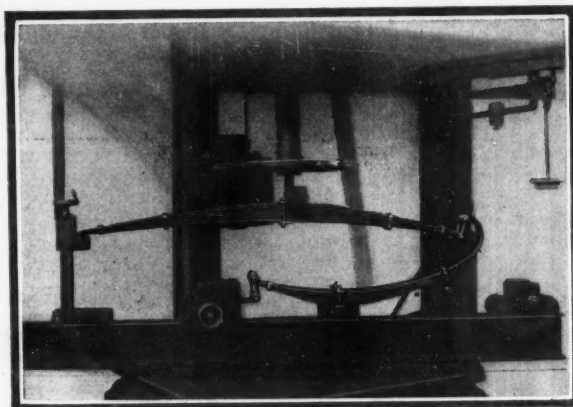
No matter how low priced your car may be, Sheldon Springs are commercially practical as equipment. For while in a few isolated cases first cost may be a little higher, the difference is so slight as to be unworthy of consideration.

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*Partial view of one
of the forging de-
partments*



*View of one of the
finishing rooms*



*Seven-eighths floating scroll elliptic mounted in
testing machine*

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Announcing the New

Studebaker Models

For the coming year Studebaker Dealers will have a **COMPLETE** line of high-grade cars in a variety of models and a range of prices to satisfy the most exacting markets.

The new cars include:

—on the 4-cylinder
40 h. p. chassis:

Touring Car, 7-passenger	\$ 885
Roadster, 3-passenger	830
Landau Roadster, 3-passenger	1185
Commercial Cars—	
Delivery Car, panel body	875
Delivery Car, express body	850
Station and Baggage Wagon	875

—on the 6-cylinder
50 h. p. chassis:

Touring Car, 7-passenger	\$1050
Roadster, 3-passenger	1000
Landau Roadster, 3-passenger	1350
Coupe, 4-passenger	1550
Limousine, 7-passenger	2250

Prices are F. O. B. Detroit

Without exception, the coming year will be the most successful year that Studebaker Dealers have ever had.

The new cars are the **BEST** that Studebaker has ever built—**QUALITY** cars in every detail. The prices are epoch-making—and mark a new era in the manufacture of high-grade cars.

But even more important from the Studebaker Dealer's view, is the fact that now he will have a **COMPLETE** line of Studebakers—a car for every possible buyer, whether that buyer desires a touring car, a roadster or a closed car.

Not a sale need be lost. And not a car need be sold with the slightest apprehension of dis-

satisfaction. For although Studebaker has always built a **QUALITY** car, these new models set a new and higher standard even for Studebakers.

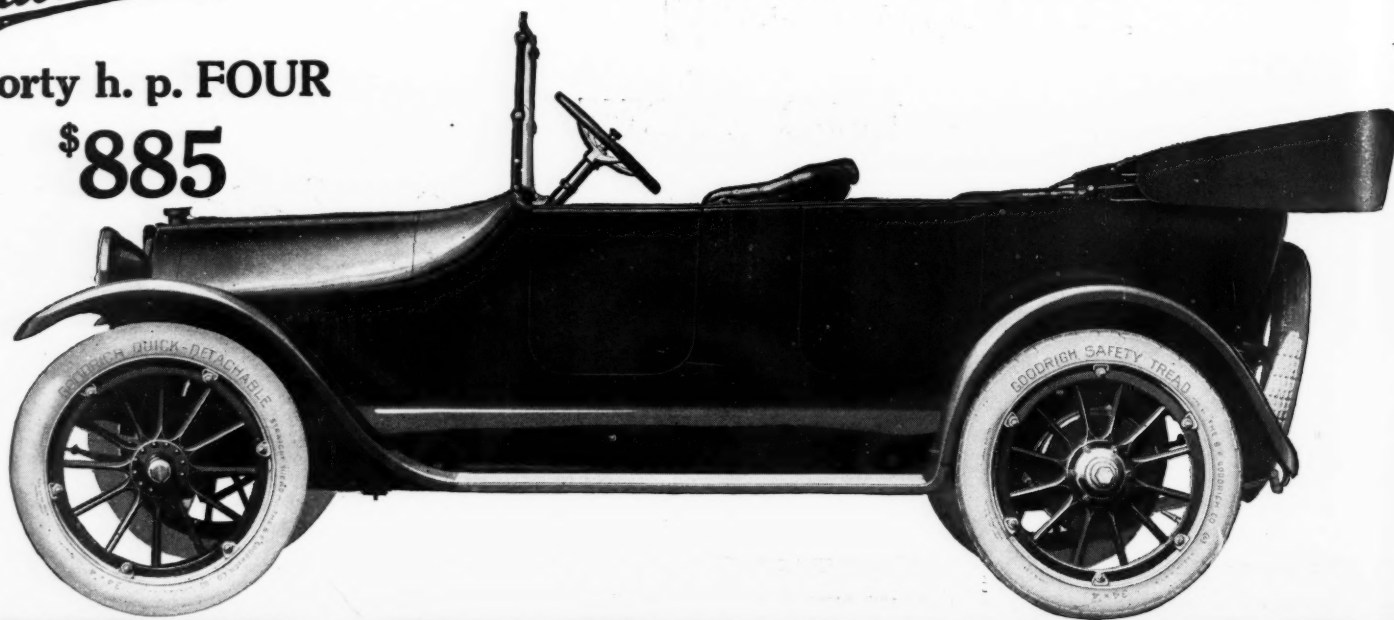
Some territory is as yet unoccupied, and Studebaker will be pleased to supply complete data to any merchants who may wish to take up the matter of a Studebaker dealership. The new form of Dealer's Agreement now in use is the fairest contract of its kind ever written. And the newly developed scheme of localized sales co-operation will be of intense interest to every progressive merchant of cars.

Address the Sales Dept., Studebaker Corporation of America, Detroit, Mich.

Studebaker

Forty h. p. FOUR

\$885



In this new car, Studebaker Dealers will have a value that overmatches any and all competition in the 4-cylinder market.

It is a big car, extraordinarily roomy, and easily carries 5 passengers but the two auxiliary seats in the tonneau fold down into the floor, disappearing completely and making a very roomy 5-passenger car. It is a FULL 40 H. P. car—the most powerful car ever offered within hundreds of dollars of its price.

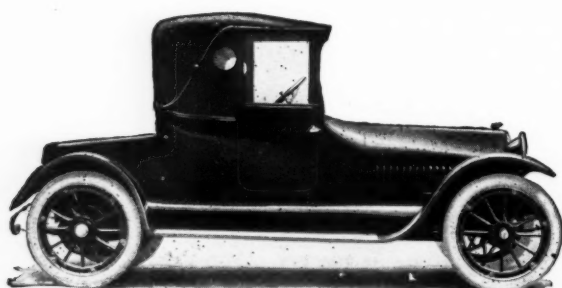
But aside from these advantages, it is one of the highest grade cars ever built at any price. We are frank to say that our profit is less on this car than on any other we ever built. It costs us more to manufacture. And set down side by side with other cars, at lower prices, the difference in quality stands out so plainly that Studebaker Dealers will have no difficulty in convincing buyers that this car is a much better investment—and that it is absolutely unnecessary to pay more for a 4-cylinder car.

SPECIFICATIONS IN BRIEF

Motor—4-cylinder cast-iron block—high-speed, long stroke type. 5-inch stroke; bore increased to 3 1/4 inches. Full 40 h. p.—(31.5 h. p. on brake-test).
 Carburetor—1 1/4 inch Studebaker-Schebler carburetor. Adjustable from 2nd. Anti-rumble gasoline tank in cowl.
 Ignition—Generator and battery system—6 volt Willard Storage Battery—Benny Coil and Benny Distributor.
 Cooling—Improved force pump; large tubular radiator. 6-blade, 18-inch ball-bearing fan.
 Oiling—Circulating splash system—gear driven pump—pressure gauge on dash.
 Clutch—Cone type. Leather faced.
 Transmission—Selective—by sliding gears—has 3 speeds forward and one reverse.
 Rear Axle—Studebaker FULL-floating axle. Larger Timken bearings—two in each hub.

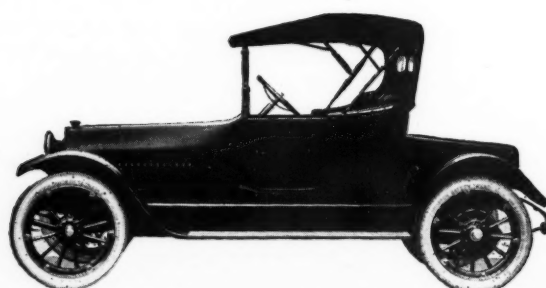
Shaft removable without disturbing wheels or differential.
 Brakes—Large cast-iron, self-grinding—12 x 7-inch brake drums, built with anti-bump Multi-bumps. Brake system of most improved type—set on rear axle.
 Springs—Semi-elliptic, 7-leaf springs in front; three-quarter elliptic, 5 1/2-inch spring 9-leaf in rear. Shocking in rear.
 Bodies—47-passenger capacity. Built complete by Studebaker. Steel panels invisibly welded. Seats are lower, larger and wider. Deeply upholstered with highest grade, hand-tanned straight grain leather—semi-bright finish and parallel tufting.
 Finish—A deep, lasting, exclusive shade of Blue—put on through a series of 18 finishing operations.
 Top—One-man top—metal bow-holders, rubber-lined to prevent rattling or cutting fabric.

Curtains—Studebaker-stowaway self-contained in top and adjustable from within.
 Electrical Starting and Lighting System—Wagner two unit, built especially for Studebaker; light, compact and perfectly reliable. All wiring carried in heavier steel tubing—can be removed as a unit.
 Windshield—Studebaker full-width, storm-proof built-in type, with solid supports; adjustable for rain and clear vision, also for ventilation.
 Tires—Larger. Goodrich 34 x 4 straight side tires. Safety tread on rear wheels.
 Wheels—Artillery type—second growth hickory. Demountable quick-detachable spring-rim with new locking device that snaps tires off without effort.
 Fenders—Crown design—Deeper and richer in finish than ever. Finished with new FLEX-IBLE Studebaker enamel baked in.
 Wheelbase—112 inches.



3-Passenger Landau-Roadster

—on 6 cylinder, 50 h. p. chassis	.	.	.	\$1350
—on 4 cylinder, 40 h. p. chassis	.	.	.	1185



3-Passenger Roadster

—on 6 cylinder, 50 h. p. chassis	.	.	.	\$1000
—on 4 cylinder, 40 h. p. chassis	.	.	.	850

Studebaker

Fifty h. p. SIX
\$1050



With this new SIX, the big and powerful car that it is, the Studebaker Dealer has a car that will instantly appeal to every prospective buyer of a SIX in his territory.

Any SIX at \$1050 would attract immediate and widespread attention. But when buyers find at that price of \$1050 a BIG 7-passenger SIX as handsome as this, with a 50 h. p. motor, and Studebaker QUALITY evidenced in every detail—it takes little imagination to foresee the record breaking demand there will be for this car.

SPECIFICATIONS IN BRIEF

Motor—6 cylinder cast on bloc—high speed, long stroke type. 3-inch stroke; bore increased to 3 1/4 inches. Full 50 h. p.—(54.5 h. p. on brake-test).

Carburetor—1 1/4 inch Studebaker-Schebler carburetor, built especially for this motor. Adjustable from dash. Anti-rumble gasoline tank in bowl.

Ignition—Generator and battery system—6 volt Willard Storage Battery—Remy Coil and Remy Distributor.

Cooling—Improved form pump; large tubular radiator. 6 blade, 16 inch ball bearing fan.

Oiling—Circulating oil system—gear driven pump—pressure gauge on dash.

Clutch—Cone type. Leather faced.

Transmission—Selective—by sliding gears—the 3 speeds forward and one reverse.

Rear Axle—Studebaker FULL-floating axle. Larger Timken bearings—two in each hub. Shaft removable without disturbing wheels or differential.

Brakes—Large easy-acting, tight-gripping—15 x 3 inch brake drums, faced with anti-burn Multi-brake. Brake equalizer of most improved type—on rear axle.

Spring—Semi-elliptic, 30 inch, 7-leaf springs in front; three-quarter elliptic, 51-inch spring 7-leaf in rear. Underdriving in rear.

Body—7-passenger capacity. Built complete by Studebaker. Steel panels invisibly welded. Seats are lower, larger and wider. Dumpy upholstered with highest grade, hand-tufted straight grain leather—semi-bright finish and parallel tufting.

Finish—A deep, lasting, exclusive shade of Blue—put on through a series of 25 finishing operations.

Top—One-man top—metal bow-holders, rubber-lined to prevent rattling or cutting fabric.

Curtains—Studebaker-stowaway self-contained in top and adjustable from within.

Electrical Starting and Lighting System—Wagner two unit, built especially for Studebaker; light, compact and perfectly reliable. All wiring carried in heavier steel tubing—can be removed as a unit.

Windshield—Studebaker full-width, storm-proof built-in type, with solid supports; adjustable for rain and clear vision, also for ventilation.

Tires—Goodrich 34 x 4 straight-side tires. Safety tread on rear wheels.

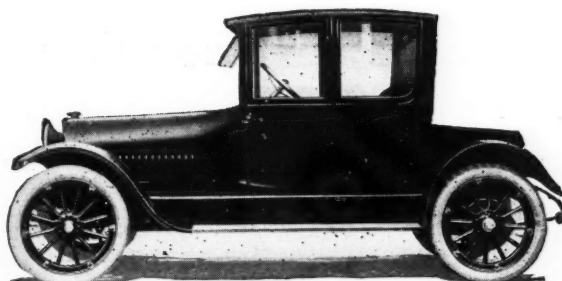
Wheels—Artillery type—second growth hickory. Demountable quick-detachable spring-rim with new locking device that snaps tires off without effort.

Fenders—Crown design—Deeper and richer in finish than ever. Cling closely to curves. Protected with new FLEXIBLE Studebaker enamel baked in.

Wheelbase 122 inches.

Also, a New
Limousine
at \$2250

a big, roomy, luxurious, 7-passenger car embodying every late refinement. One of the handsomest cars ever built. Photos not ready when this publication goes to press. Write for special photos.



4-Passenger Coupe

—only on 6 cylinder 50 h. p. Chassis at \$1550

Studebaker

Commercial Cars

Delivery Car, Panel Body - - - - -	\$875
Express Wagon - - - - -	850
Station Wagon - - - - -	875

Studebaker Dealers are extremely fortunate in having in this new Commercial Car a vehicle that sums up the DOUBLE experience of Studebaker in manufacturing motor cars and delivery vehicles of every nature.

It is a new car, MORE POWERFUL than ever, designed and manufactured solely for commercial purposes and is one of the most economical cars on the market. And every detail of the car is built with the exacting care that characterizes the manufacture of the pleasure cars. It is a QUALITY car that Studebaker Dealers can sell with the certainty of satisfaction.

Any Dealer or merchant who wants a line of commercial cars for which a strong demand already exists, is invited to write for full particulars.

SPECIFICATIONS IN BRIEF

Motor—4 cylinders—3½ inch bore, 5 inch stroke. Full 40 horsepower.

Lubrication—Force pump circulating splash system—gear drive pump—pressure gauge on dash. Sure and economical.

Cooling—Centrifugal force pump—large radiator of tubular type.

Ignition—Studebaker-Remy system from storage battery.

Carburetor—Studebaker-Schebler—built especially for this motor.

Electric Starting and Lighting System—Studebaker-Wagon system—two unit system—proved by good four years' successful use on Studebaker delivery cars.

Rear Axle—Studebaker FULL-floating axle—two Timken bearings in each hub.

Brakes—Large, easy-acting, tight-gripping brakes with 15 x 2 inch drums. Equalized.

Tires—36 x 4 inches—Goodyear.

Steering—Irreversible type, left hand drive, center control.

Springs—Studebaker famous springs—semi-elliptic, 38 inch springs in front; three-quarter elliptic, 31 inch springs in rear.

Wheel Base—112 inches.

Completely equipped.

Photographs not ready when this publication went to press. Write at once for photos and complete specifications of the new Studebaker Commercial Cars.

Battery Service That IS Service

First: Every Gould Automobile Battery is guaranteed to give thorough satisfaction, and if not fully justifying every claim will be replaced with liberal readjustment on the price of a new battery.

Second: Gould Service Stations and representatives all over the country are instructed to co-operate with our customers in keeping Gould Batteries *constantly* in best possible condition.

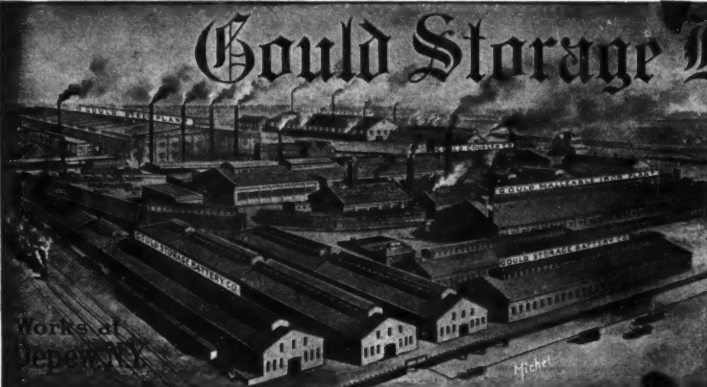
Third: The Gould Guarantee is backed by a perfect organization with millions of dollars invested in plant and equipment, established for 15 years and second to none for engineering ability, business integrity and liberal treatment of patrons.

We are the *first* and *only* battery manufacturers to offer a protective guarantee.

Car builders will equip your new car with Gould Guaranteed Battery *if you insist*; or if the battery on your present car is faulty, a Gould Guaranteed Battery exactly meeting electrical requirements and fitting your battery box can be installed by any repair shop.

**Avail yourself of this
protection**





Gould Storage Battery Co.

Genl. Offices, 30 E. 42nd St. New York

Boston—347 Newbury St.
 Philadelphia—618 Lincoln Bldg.
 Cleveland—1761-65 E. 18th St.
 Detroit—Kerr Bldg. Chicago—225 E. 22d St.
 San Francisco—1448 Van Ness Avenue.
 Los Angeles—118 E. Pico St.

AGENTS IN
 Washington, Rochester, Buffalo, Pittsburgh, Milwaukee,
 Minneapolis, St. Paul, Kansas City, Omaha, Denver, To-
 peka, Seattle.

CANADIAN REPRESENTATIVE: R. E. T. Pringle,
 Toronto, Montreal, Winnipeg, Vancouver.
 Full stock of parts, plates and repairs carried by all of-
 fices and agents. (151)

BUILD YOUR WITH THESE

Signs of Big Car Value

Six-cylinder 4 x 4½ motor, seven-bearing crankshaft, unit power plant, frame pressed steel, 120-inch wheelbase, 34x4 tires (non-skid rear), completely equipped in every detail.

"TOO much car for the money." That was the cry of the motor world when Herff-Brooks cars were first announced. Today Herff-Brooks standards and prices are being followed by the biggest builders in the country. But while others trim down values to meet these prices, Herff-Brooks are built better than ever.

Dealers—Never in the history of the automobile has such value been built into a car as in Herff-Brooks for 1916.



Another
Drop in
Price of
\$290

The Big Six

Now \$1095

Don't be confused by the word "Six." There are all kinds of Sixes. This Herff-Brooks Six is a big one. A smashing, beautiful big car that has class. Park it alongside of any Six on the market and you get at once just that feeling of impressiveness that sells cars. It has everything it had at \$290 more money and a lot of new big value points that set it in a class by itself.

Touring Cars and Roadsters—Write for full specifications

Herff-

DEALERS

The Herff-Brooks Corporation has always put its money into the cars rather than into national advertising. We have built our business by giving the dealer a chance to make

CAR BUSINESS CAR VALUES

Get the specifications. Study them. Have a look at the new Sixes and Fours. They are big. They fairly yell value. And, Mr. Dealer, here is a car and a dealer's proposition that gives you a chance to make some money. No 17, 18 or 19% business. No sliding scale either. You make your profit no matter whether you sell five or fifty cars.

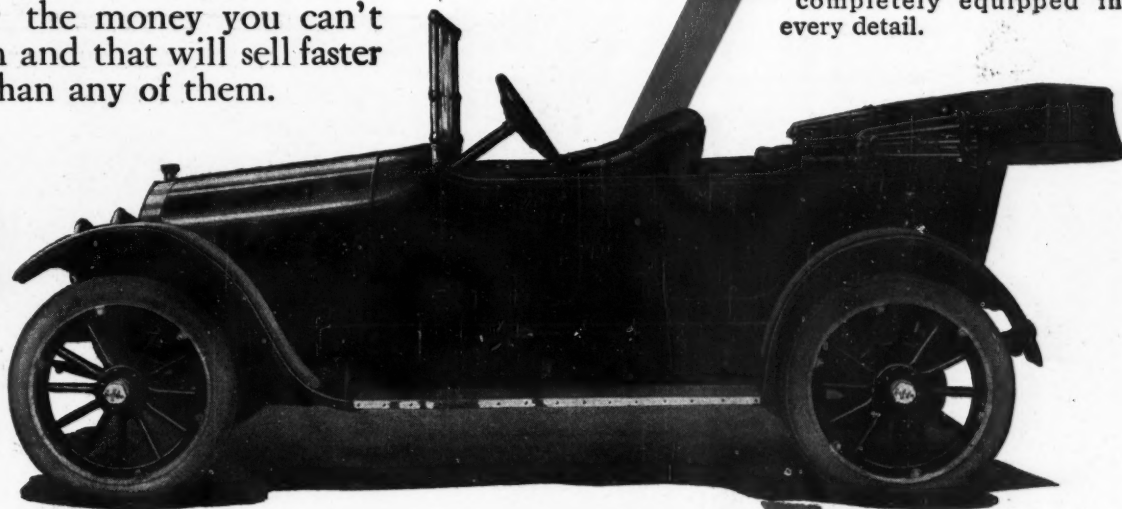
We've got the car, the price and the proposition for you. And just to prove it, if you mean business, we will take you to the factory and show you a car for the money you can't get away from and that will sell faster and quicker than any of them.

Write Today

**Herff-Brooks
Corporation**

Dept. A

Indianapolis
Indiana



**The
Four
That
Leads
Them All**

Four-cylinder 4 x 4½ motor, five-bearing crankshaft, unit power plant, frame pressed steel, 110-inch wheel base, 33x4 tires (non-skid rear), completely equipped in every detail.

Brooks

Get This Proposition

**The Big Four
\$885
Now**

And it is a Four. Size, finish, power, smoothness. The man who buys this Four is going to have the best looking, the sturdiest, the smoothest riding Four in town. Herff-Brooks Fours have always set the standard for all Fours. Now we want you to see what you are getting at \$215 less money.

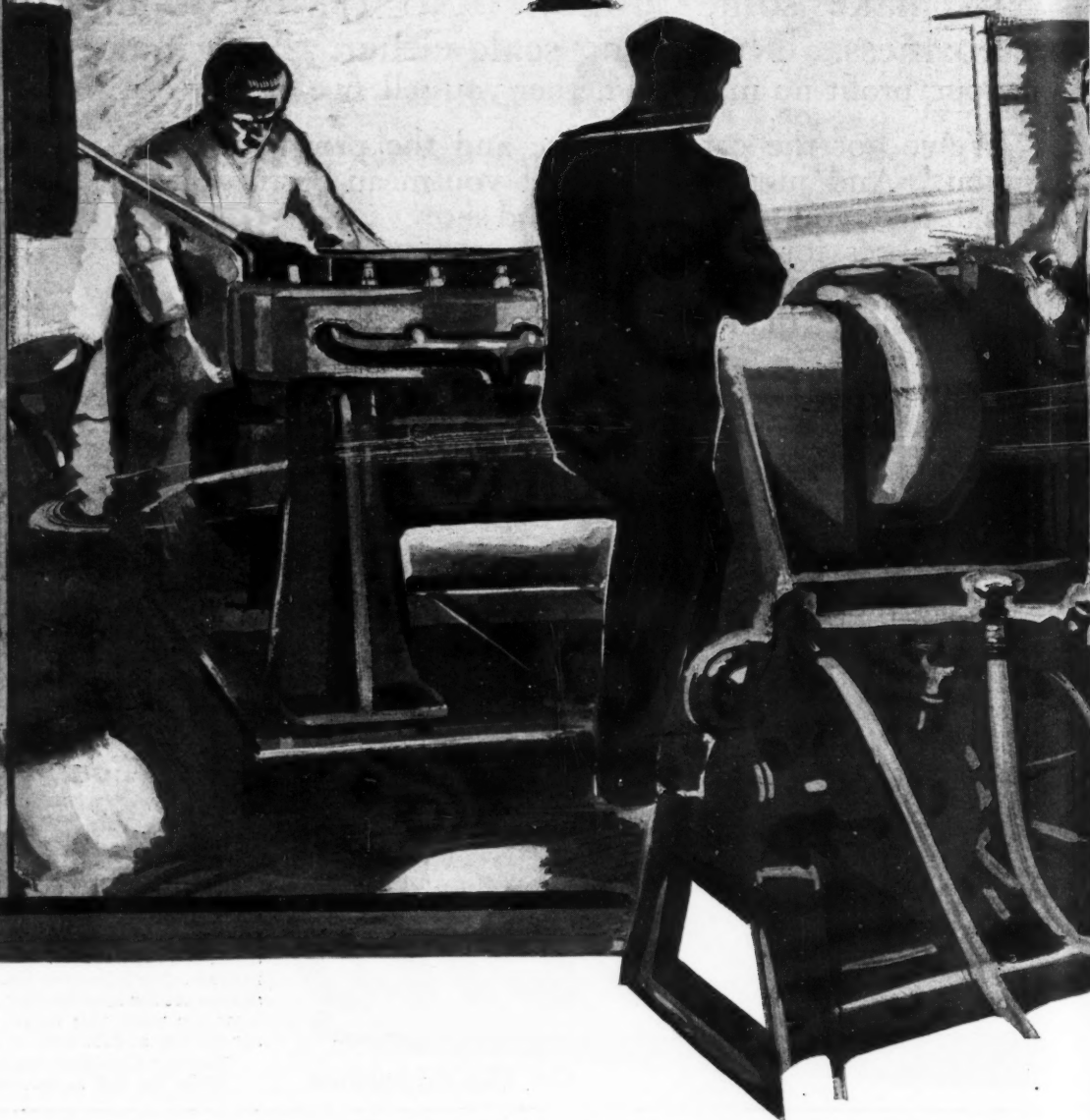
**Touring Cars and Roadsters—
Write for full specifications**

**\$215
Lower
Than
Ever**

money and putting extra value into the cars he has to sell. This year we have worked out a co-operative selling and advertising proposition that will get the business for the dealer. If you want to know about it don't wait. Drop us a letter at once.

NO TASK TOO HARD

Jumbo Design and Jumbo Construction have been tested and found impervious to the punishment the most modern high-speed, high-compression motors give spark plugs.



Gibson-Hollister Manufacturing Company

When Writing to Advertisers, Please Mention Motor Age

The evolution of their design—the selection of materials and the determination of the results

JUMBO



SPARK PLUGS

will give is more like the work put in on the development of a motor than anything else. Probably no other spark plug on the market can boast of having dynamometer and road tests check up and determine the relative value of each detail of its design—each stage in the development of its porcelains—each method of making it gas tight—rust proof—heat proof—self cleaning, etc.

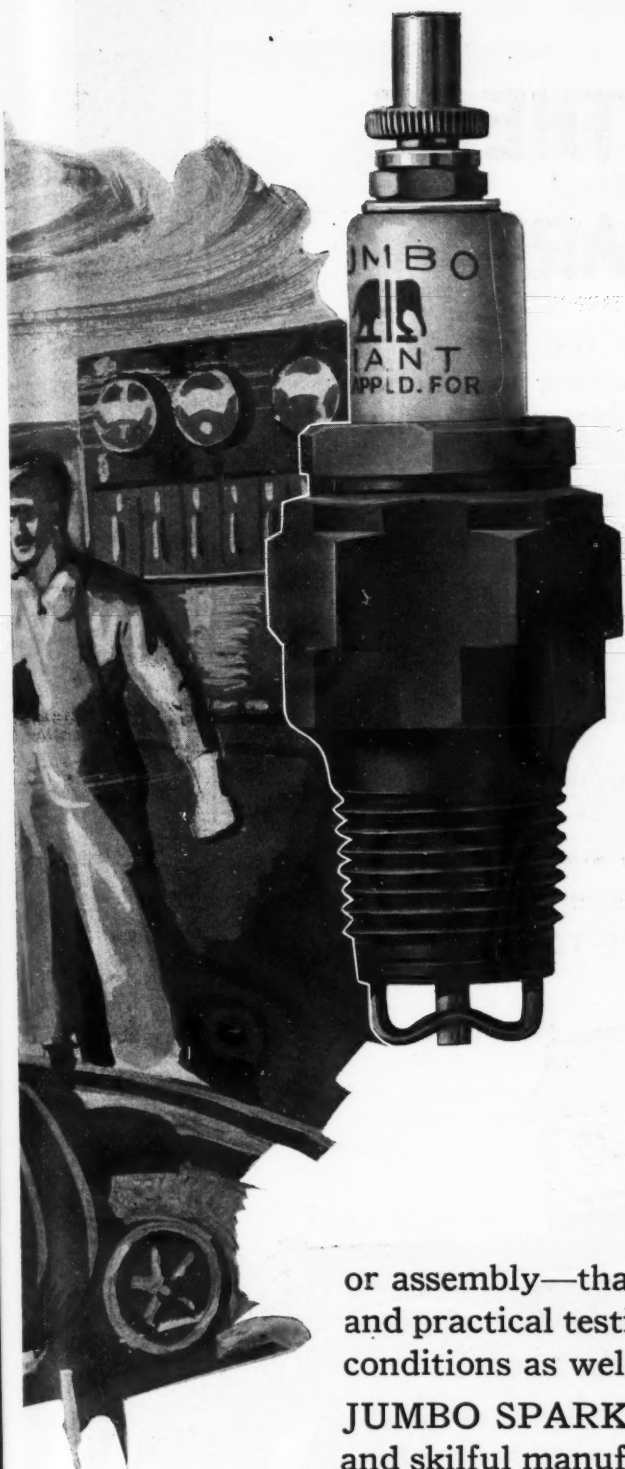
Nothing has been overlooked in JUMBO PLUGS' design, materials

or assembly—that modern laboratory science could suggest, and practical testing—on the block—on the road—under bad conditions as well as under good conditions, could develop.

JUMBO SPARK PLUGS are as good as engineering science and skilful manufacture can make them and the service they give is worth many times the difference in price may seem to indicate.

3380 Washington Ave., Boston, Mass.

When Writing to Advertisers, Please Mention Motor Age



DODGE BROTHERS

MOTOR CAR

The specifications indicate why the car is so splendidly responsive, so swift in getting into action, so comfortable, so silent, so steady; and they are also worthy of being carefully studied because they evidence how high was the standard the manufacturers set for themselves:—

One-man top; Jiffy curtains; real leather upholstery; deep, soft tufting of natural curled hair; streamline steel body; oval moulded fenders; 30-35 h. p. bloc motor with removable head; full floating rear axle; Timken bearings thruout; imported Swiss ball bearings in clutch and transmission; waterproof Eisemann magneto; 12-volt Northeast motor generator for starting and lighting; self-lubricating Chrome Vanadium steel springs; drop forgings and drawn work instead of castings.

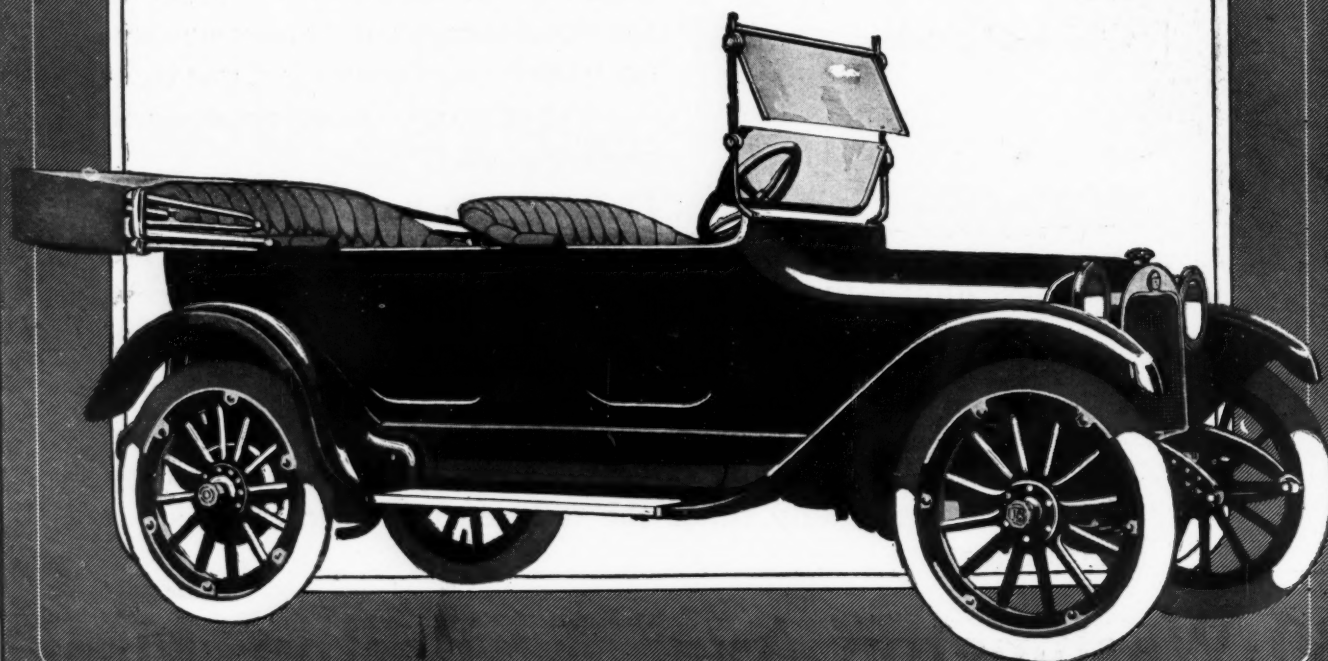
The wheelbase is 110 inches

The price of the car complete is \$785

(f. o. b. Detroit)

Canadian price \$1100 (add freight from Detroit)

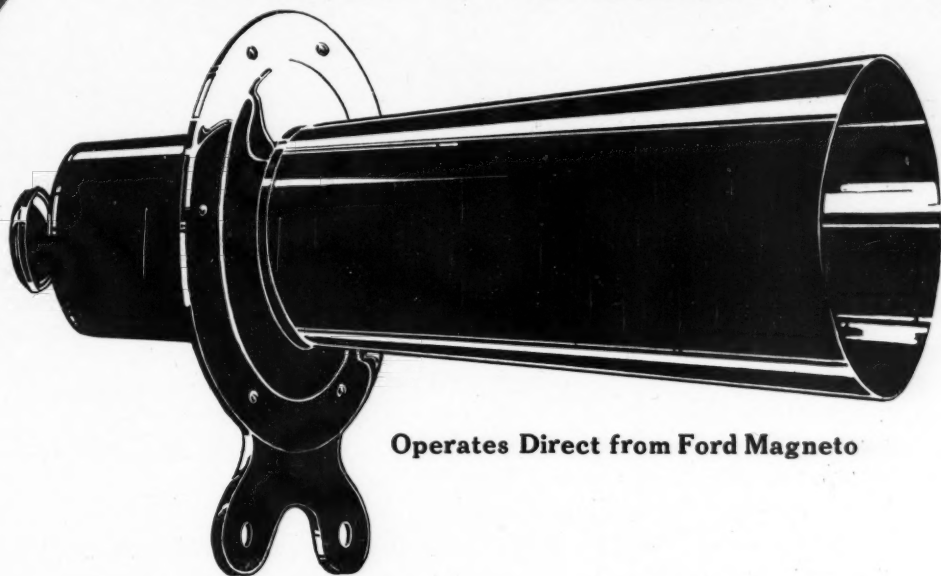
DODGE BROTHERS, DETROIT




HEINZE





ELECTRIC HORN SPECIAL FOR Model T FORDS





Operates Direct from Ford Magneto

The  is the first and only electrically operated horn built especially for Model "T" Fords.

The  operates direct from the Ford flywheel magneto, and does not reduce quality of lights or interfere with ignition. It is a practical horn of few parts. Built strong as most expensive electric warning signal. Less liable to accident and "time out" for repairs.

Attaches under hood, in latest approved fashion. Operated by convenient switch on steering post. No heavy plunger to pull or push. One finger works the .

First cost with  is the last. Every Ford owner needs one. Best for the Ford car. Price \$3.50. Write for free circular.

Dealers—Write for details and liberal discounts.  is built to meet Ford conditions at a reasonable price.

Price Complete
With Cable Switch and
Attachments

\$3.50

Price Complete
With Cable Switch and
Attachments

HEINZE ELECTRIC COMPANY

Sales Office: Detroit, Michigan
Factories: Lowell, Mass.

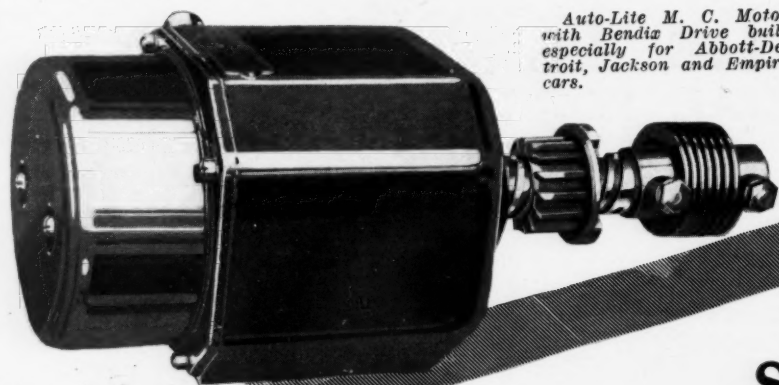
BRANCHES
NEW YORK CITY
1876 Broadway
CHICAGO, ILL.
1256 Michigan Ave.

BRANCHES
MINNEAPOLIS, MINN.
33 S. Eleventh St.
New England Agent
ARTHUR P. HOMER
154 State St., Boston, Mass.

When Writing to Advertisers, Please Mention Motor Age

Electric Auto-Lite

STARTING - LIGHTING - IGNITION



*Auto-Lite M. C. Motor
with Bendix Drive built
especially for Abbott-Detroit,
Jackson and Empire
cars.*

Every Auto-Lite System Is a Built- To-Order Mechanism

EACH Auto-Lite model is designed especially to meet the fixed requirements of the particular car or group of cars with which it is supplied. Each of our patrons is provided with the size and style of units most suited to his product.

Consequently there are many Auto-Lite models. *But there is only one Auto-Lite standard of quality.*

Auto-Lite efficiency is well known.

Auto-Lite dependability has been demonstrated beyond question.

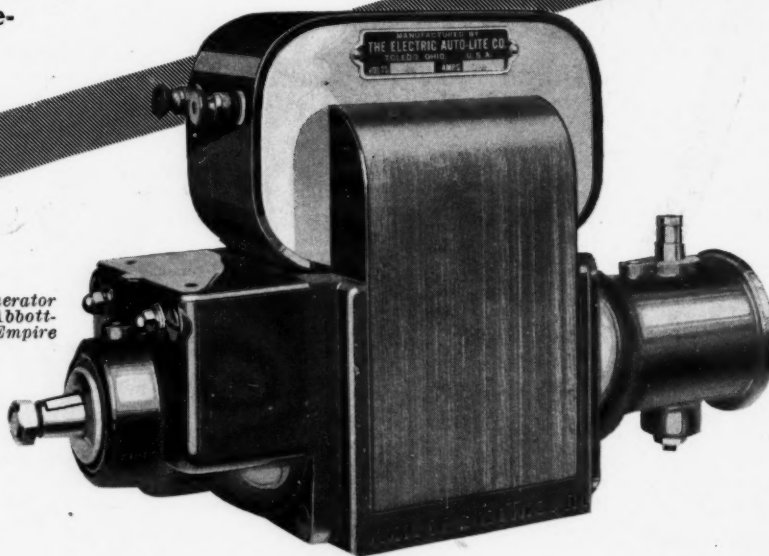
Every existing manufacturer who has ever equipped his cars with the Auto-Lite is still doing so.

These satisfied customers are the biggest asset of this company.

Insist upon the Auto-Lite.

You will find it on the following:

Overland, Abbott-Detroit, Moline-Knight, Chevrolet, Jackson, Monroe, Empire and other new models.



*Auto-Lite G. F. Generator
built especially for Abbott-Detroit, Jackson and Empire cars*

The Electric Auto-Lite Co.

Home office and factory, Toledo, O.

New York

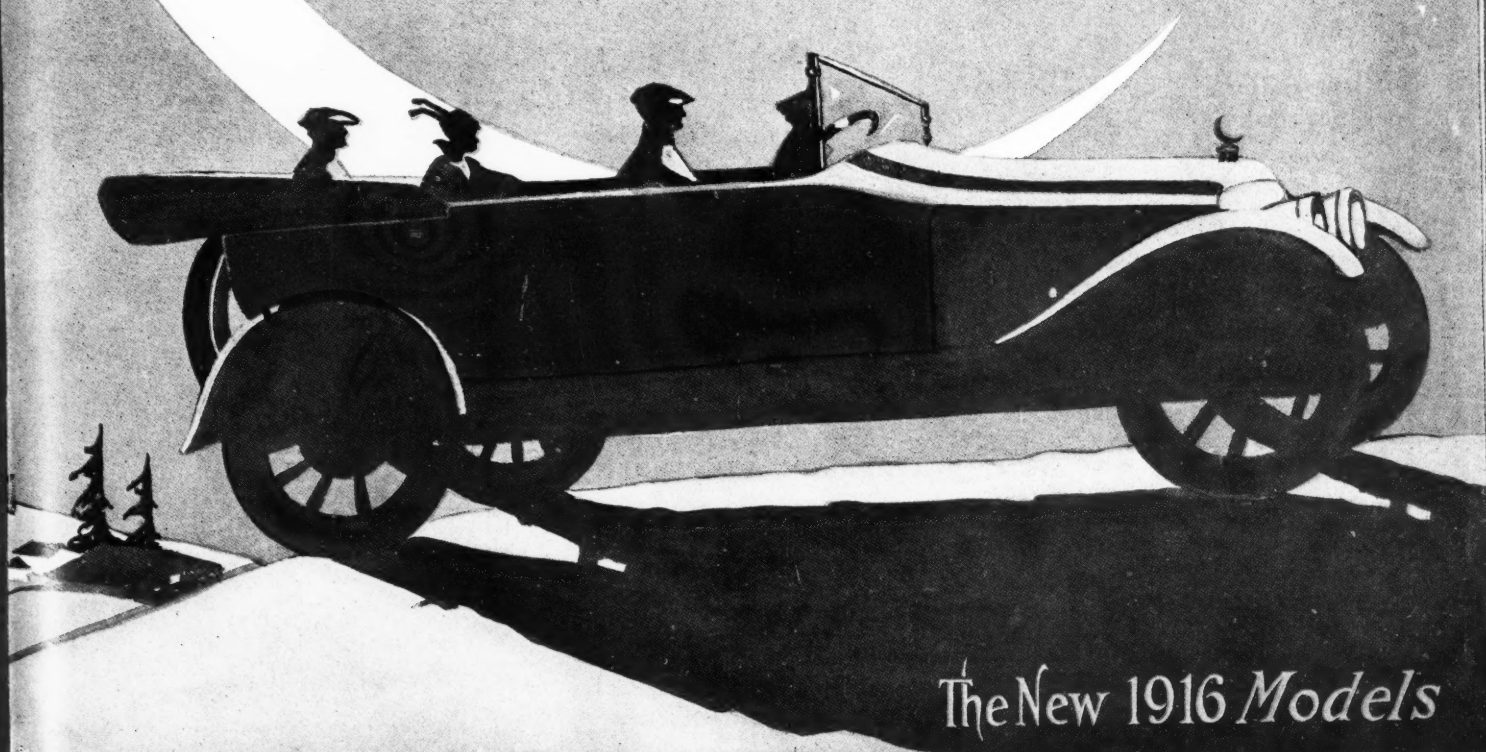
Detroit

Kansas City

San Francisco

When Writing to Advertisers, Please Mention Motor Age

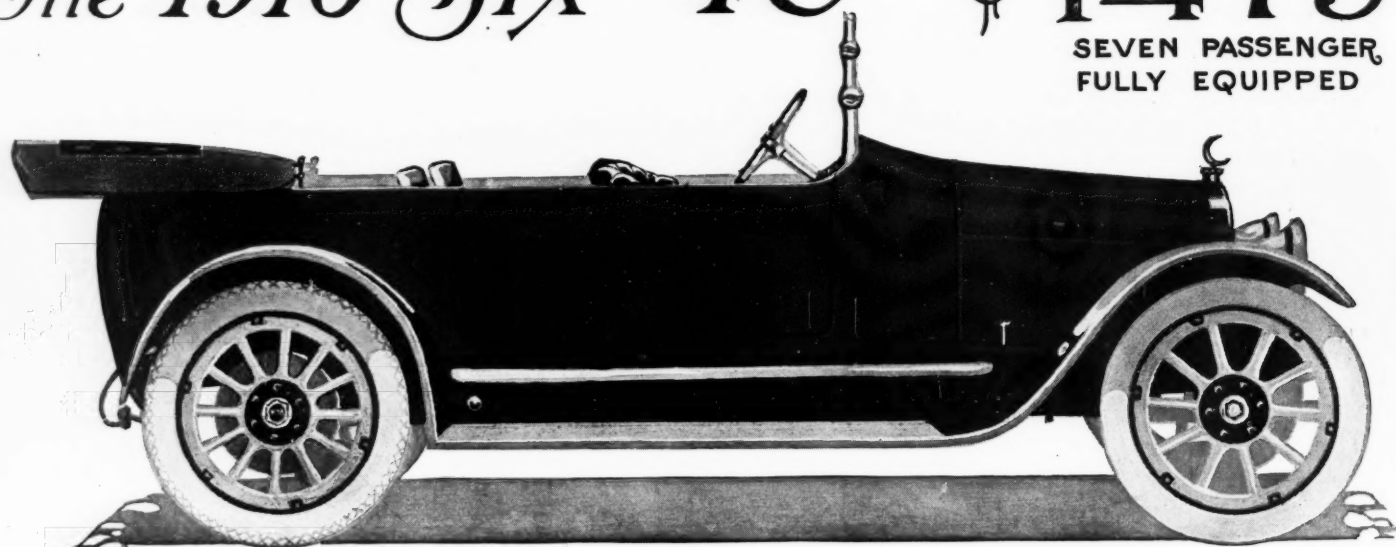
New
MOON
Sixes



MOON

The 1916 Six-40 \$1475

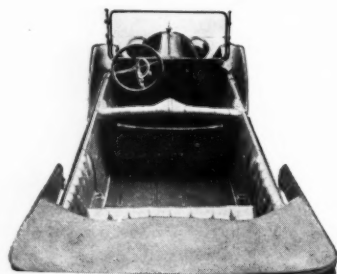
SEVEN PASSENGER
FULLY EQUIPPED



More than Ever~for Less than Ever

A BIGGER AND MORE LUXURIOUS CAR—seven passenger—better appointments and superior refinement. Powerful new Continental-Moon Motor, $3\frac{1}{2} \times 5$, with new 1916 Delco starting, lighting and ignition system with new switch, having ammeter on dash. A longer wheelbase—124 inches. 45-inch leg room for driver. Short turning radius—can be turned in narrowest city streets.

Look at the picture—note the new body design. The two disappearing seats are absolutely concealed when not in use. Car color scheme a rich Brewster Green, upholstered in tan Spanish leather. Choice of Kelly-Springfield or Firestone tires—34x4—rough tread tires

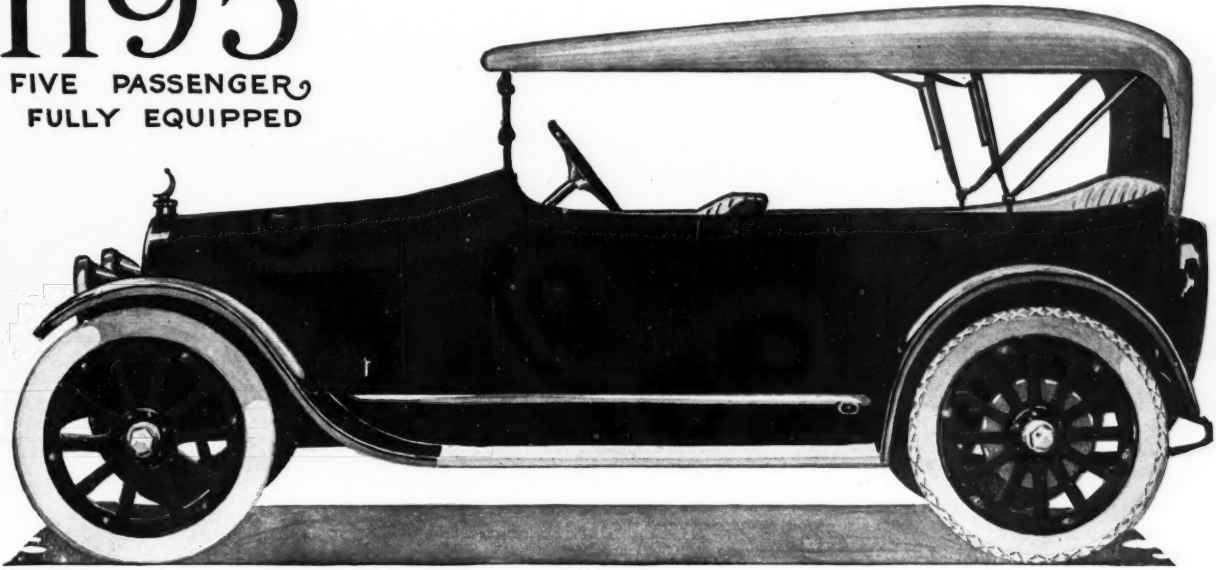


Bird's-eye view of Six-40 Tonneau showing how the extra seats slide forward, out of the way, into the back of the front seat.

on rear wheels—extra rim on rear. Left-hand drive and center control. Rear axle, pressed steel, full floating, annular bearings throughout. Dry plate multiple disc clutch—three speeds ahead and reverse. Stewart patent vacuum gasoline feed system. Crown fenders—Stewart speedometer—silk mohair one-man type top.

MOON

\$ 1195
FIVE PASSENGER
FULLY EQUIPPED



and the *New Six - 30*

THE difference between this car and the Six-40 is the difference between publishing two editions of a book; one in large type and the other in smaller type. The reading matter's the same, but one is more compactly presented than the other and costs a little less.

30 H-P instead of 40 H-P motor is Continental-Moon, 6-cylinder, $3\frac{1}{4} \times 4\frac{1}{2}$, cast en bloc, with new type removable cylinder heads.

Delco starting, lighting and ignition system with new switch, having ammeter on dash.

Wheelbase 118 inches — longer than most cars — just a bit shorter than the Six-40.

Short turning radius—can be turned in narrowest city streets.

New convex-side Tumble-Home Body design—the picture shows why it's called that.

Front springs semi-elliptic. Rear springs something new. Here the frame drops down to end in elliptical curve—here the spring meets it and curves back in semi-ellipse to where it attaches to body of frame.

The tires are 33x4. Demountable. Extra rim on rear. Car color Brewster Green, upholstered in tan Spanish leather. Left-hand drive and center control. Brakes new 1916 design giving perfect equalization on all brakes. Rear axle pressed steel, full floating, annular bearings throughout. Dry plate multiple disc clutch—three speeds ahead and reverse. Stewart patent vacuum gasoline feed system. Crown fenders—Stewart speedometer—silk mohair one-man type top.

Detailed Specifications

New Six-40

BODY—Pure streamline design. Deep cowl and instrument board. Extremely large tonneau; wide tonneau doors (22-inch) with concealed hinges and concealed locks. Both front doors open wide, permitting the driver to enter from either side. Comfortable driver's position—with 45-inch leg room. Upholstering done in genuine leather, highest grade, stuffed with curled hair. Clear running boards.

FRAME—Pressed steel, especially designed for Hotchkiss drive; with deep strangle in front to enable short turning radius (can be turned in the narrowest city streets). Constructed in rear to form integral support for gasoline tank and tire-irons—a more secure anchorage than simply brack-eting them on.

FRONT AXLE—I-beam, drop forge, special heat treated.

REAR AXLE—Pressed steel housing, full floating, annular bearings through-out. Spiral gears.

SPRINGS—Front: semi-elliptic. Rear: three-quarter elliptic, underslung. Grease cups throughout.

TIRES—34 x 4. Demountable. Extra rim on rear. Choice of Kelly-Spring-field or Firestone rugged tread tires on rear wheels.

MOTOR—Continental-Moon unit power plant. Six-cylinder, 3½ x 5, cast en bloc. Pressed steel oil pan. Enclosed valves. Lubrication—pump and constant level splash.

COOLING—Honeycomb type radiator, with removable shell. Water-pump circulation.

IGNITION—New Delco type ignition, with automatic spark advance. A new switch with ammeter on dash.

STARTER—New Delco improved starting and lighting system.

CLUTCH—New style improved dry plate disc.

TRANSMISSION—Three speeds ahead and reverse. Nickel-steel gears, mounted on annular bearings.

STEERING GEAR—Worm and gear. 18-inch steering wheel, with corru-gated rim.

DRIVE—Hotchkiss drive, with underslung rear spring.

BRAKES—New equalizing brake system through cross shaft and tube. 14-inch brake drums.

CONTROL—Left-hand drive, center control. Shifting levers out of way of front seats, but close to driver.

GASOLINE TANK—On rear; capacity, 17½ gallons.

GASOLINE FEED—Stewart patent vacuum system.

FENDERS—Crown fenders.

WHEELBASE—124 inches.

TREAD—Standard.

WEIGHT—2,950 pounds.

TOP—Silk Mohair, one-man type.

SPEEDOMETER—Stewart.

STANDARD EQUIPMENT—Electric headlights (Delco system) with dimmers and electric tail lamp, all operated from dash control. Electric wiring enclosed in steel conduits. Patented windshield—clear vision, rain vision and adjustable. Tire irons on rear, giving perfectly balanced car. Extra demountable rim on rear. Full kit of tools. Trouble lamp. License plate brackets. Hand tire pump. Tire repair outfit.

PRICE—Seven-passenger car, fully equipped, \$1475, F. O. B. St. Louis.

New Six-30

BODY—New 1916 Tumble-Home type body, new convex side, pure stream-line design. Deep cowl and instrument board. Extremely large tonneau; wide tonneau doors (22-inch) with concealed hinges and concealed locks. Both front doors open wide, permitting the driver to enter from either side. Comfortable driver's position—with 44-inch leg room. Upholstering done in genuine machine-buffed leather, stuffed with curled hair. Clear running boards.

FRAME—Pressed steel, especially designed for Hotchkiss drive; with deep strangle in front to enable short turning radius (can be turned in the narrowest city streets). Constructed in rear to form integral support for gasoline tank and tire-irons—a more secure anchorage than simply brack-eting them on, also to conform to new type, rear spring construction.

FRONT AXLE—I-beam, drop forge, special heat treated.

REAR AXLE—Pressed steel, full floating, annular bearings throughout. Spiral gears.

SPRINGS—Front: semi-elliptic. Rear: new semi-elliptic. (See above).

TIRES—33 x 4. Demountable. Extra rim on rear.

MOTOR—Continental-Moon unit power plant. Six cylinder, 3¼ x 4½, cast en bloc. New type cylinder heads removable. Pressed steel oil pan. Enclosed valves. Lubrication—pump and constant level splash.

COOLING—Honeycomb type radiator, with removable shell. Water-pump circulation.

IGNITION—New Delco type ignition, with automatic spark advance and am-meter on dash.

STARTER—New Delco improved starting and lighting system.

CLUTCH—New style improved single plate, disc.

TRANSMISSION—Three speeds ahead and reverse. Nickel-steel gears, mounted on annular bearings.

STEERING GEAR—Worm and gear. 17-inch steering wheel, with corru-gated rim.

DRIVE—Hotchkiss drive.

BRAKES—New 1916, giving perfect equalization on all brakes.

CONTROL—Left-hand drive, center control. Shifting levers out of way of front seats, but close to driver.

GASOLINE TANK—On rear; capacity 17½ gallons.

GASOLINE FEED—Stewart patent vacuum system.

FENDERS—Crown fenders.

WHEELBASE—118 inches.

TREAD—Standard.

WEIGHT—2,500 pounds.

TOP—Silk Mohair, one man type.

SPEEDOMETER—Stewart.

STANDARD EQUIPMENT—Electric headlights (Delco system) with dimmers and electric tail lamp, all operated from dash control. Electric wiring enclosed in steel conduits. Patented windshield—clear vision, rain vision and adjustable. Tire irons on rear, giving perfectly balanced car. Extra demountable rim on rear. Full kit of tools. Trouble lamp. License plate brackets. Hand tire pump. Tire repair outfit.

PRICE—Five-passenger car, fully equipped, \$1195, F. O. B. St. Louis.

These Sixes are Real, Man-Sized Automobiles

Don't confuse them with the Little Sixes and miniature cars that are flooding the market, that are being made simply to satisfy a price.

And, speaking of price, don't forget we could just as easily have made the Six-40 for \$1285 and the Six-30 for \$995 had we been willing to compromise such features as—

A Continental Engine for another type;
A Delco for a less favorable starter;
A cheaper carburetor;
Gasoline tank in the cowl instead of on the rear
with the vacuum system;

Any other type of bearings than annular in the
transmission or nickel steel in the gears;
Genuine, high-grade leather, with our special
Spanish tanning for imitation or dyed black
leather, and a host of other ways.

BUT, when \$200 covers the gap from mediocre material to that which stands unquestioned, as the standard with the automobile world, surely you will not let it stand between you and a real car.

Live Dealers—A Word

REMEMBER, in such big automobile centers as New York, Cleveland, Minneapolis, Los Angeles, Des Moines, Saint Louis, etc., the MOON SIX-40 was one of the two most popular light weight Sixes. Profit by the success of others.

If you are not already a Moon dealer you're anxious to be. It is possible that through shifts or opening of new territory there is an opening for you. Our magazine and news-paper advertising and our general co-operation do big things for the right kind of dealers. Maybe you are one. Write and see.

MOON MOTOR CAR CO.
ST. LOUIS, U. S. A.

Wins Again

New Records for

RAYFIELD

CARBURETORS

Won—all events in NATIONAL PIKE hill climbing classic at Uniontown, Penn., on June 24th, by Rayfield equipped cars; 1st place in the first event and first and second in the second event, breaking all previous records. This duplicates last year's victory made by a Rayfield equipped Kline car.

Over the three mile climb up the Blue Ridge Mountains, on a rough winding road, here are the marks set—

Packard—Rayfield equipped—3 minutes 27 seconds
 Chalmers—Rayfield equipped—3 minutes 50 seconds
 Saxon—Rayfield equipped—second to Chalmers in Class E.

Superior speed with power at the same time was proved by the new records. The Rayfield got the gas into the cylinders in proper proportion to carry the big load—and fast enough to maintain the high motor speed.

Quicker acceleration—ability to pick up quickly and get away was proved at the curves. The drivers stepped on the accelerator, the Rayfield responded and they were away without a second lost time.

Consistent performance was proved by record breaking service from three entirely different types of motors. Rayfield carburetor meets the requirements of all.

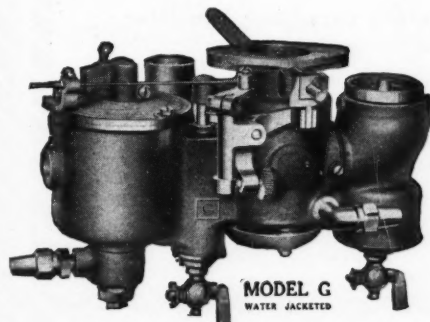
Hill climbing brings out the efficiency of a carburetor more than any other test. Rayfield will do for your car what it did for the cars in this big hill climb.

FINDEISEN & KROPF MFG. COMPANY
 2109 Rockwell Street, Chicago

1140 Michigan Ave.
 Chicago

BRANCHES:
 1902 Broadway
 New York

1214 Woodward Ave.
 Detroit



1916

REGAL

1916

DEALERS Study the three Regal cars—opposite page—note their attractive design and prices—size up the equipment and specifications—compare them with other cars. This 1916 offering is our greatest in more than eight years of car building. With these three Regals you can close any prospect because one of the three is almost sure to meet their ideas of size, quality, appearance and price.

THE LIGHT FOUR This car has done just what we claimed it could do when we launched it upon the market. It has "stood up," given real service over all kinds of roads and under the most adverse conditions. It's a real car—not an experiment or a "near car," but one that has **proven** its worth. Complete equipment from electric starting and lighting system down to demountable rims. 106 inch wheel base. Finished throughout with care. A fine and complete piece of workmanship and a wonderful value.

**Light
Four
\$650**

THE STANDARD FOUR One of the strongest evidences of Regal sturdiness—of the power that has built the stable Regal reputation. Your "Four" prospects will take to it immediately and they will be stronger for Fours than ever. No other four cylinder car under \$1050 has such a powerful motor (3¾x5)—no other can surpass it in performance. Complete equipment—electric starting and lighting systems—one-man silk mohair top, ventilating windshield, head and tail lights, dimmers, etc. Genuine Number 1 M. B. Leather upholstery. 112 inch wheel base. A big value that you can sell, knowing that you are giving your customers full value for their money.

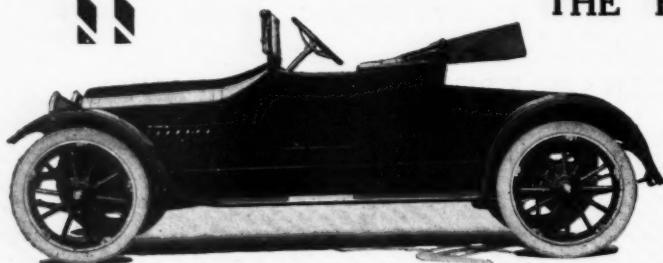
**Standard
Four
\$985**

THE DE LUXE EIGHT Here's a chance to give vent to sincere enthusiasm on your Eight prospects. Supply your people with an Eight that will deliver all the practical satisfaction of which an Eight is capable. It has abundant power, smooth, flexible, vibrationless, at a price they will readily pay. The quality that must be in every Regal has been maintained in this splendid car. We have not attempted to make a cheap Eight to sell at a Four price. To be the car that it is, the De Luxe Eight **must** sell at \$1200 and it is worth every cent of the price. Like the other two Regals, it is unsurpassed in its class.

**DeLuxe
Eight
\$1200**

REGAL ROADSTERS All three Regal touring cars have Roadster mates. Same quality—same equipment—same price. Aggressive, reliable dealers will learn something to their decided advantage by paying a visit to the factory or inquiring into our proposition.

THE REGAL MOTOR CAR CO.
401 PIQUETTE AVENUE
DETROIT, MICH.



When Writing to Advertisers, Please Mention Motor Age

1916

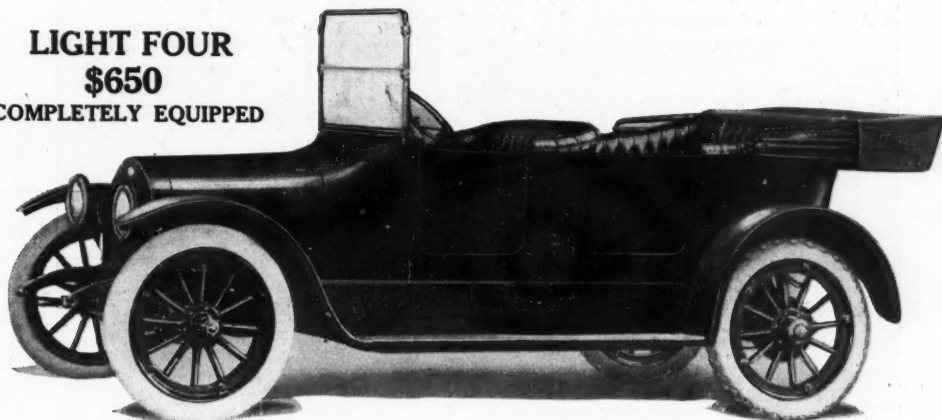
REGAL

1916

LIGHT FOUR

\$650

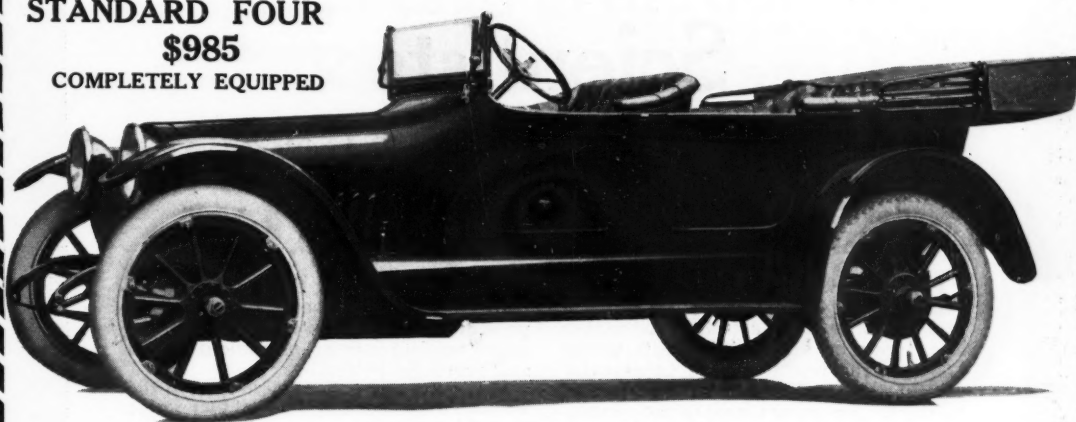
COMPLETELY EQUIPPED



STANDARD FOUR

\$985

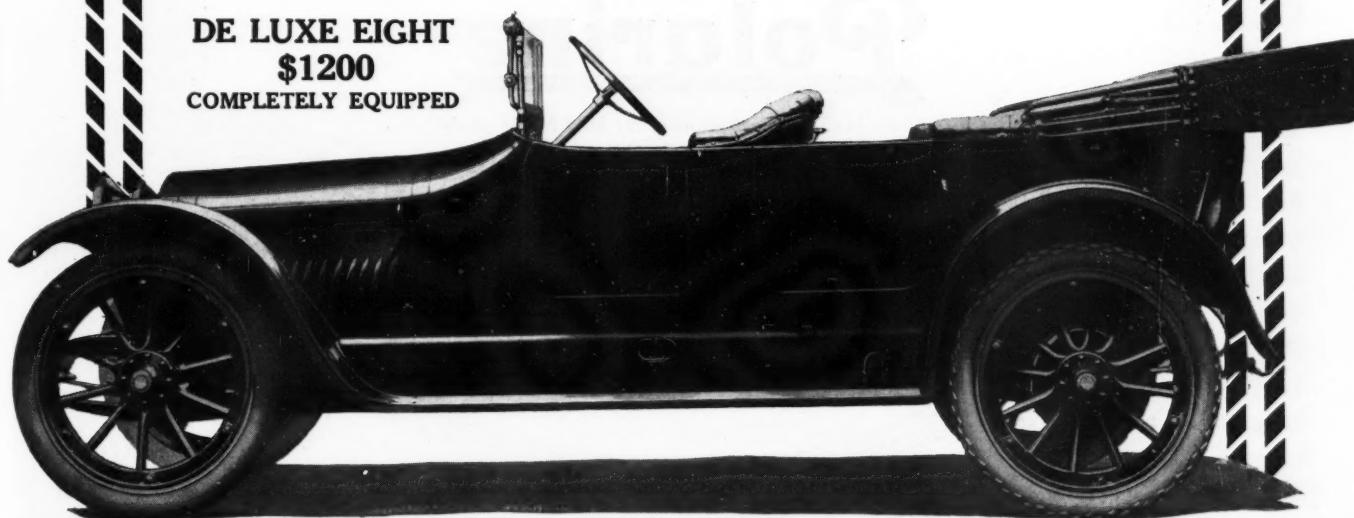
COMPLETELY EQUIPPED



DE LUXE EIGHT

\$1200

COMPLETELY EQUIPPED



When Writing to Advertisers, Please Mention Motor Age



Scientists

with every facility at their command, and with access to the most complete equipment in the world, have developed POLARINE for the lubrication of your motor car. POLARINE is the Scientific Oil.

Polarine, which is recommended by the Standard Oil Company for the lubrication of motors in all standardized makes and types of automobiles and motor boats, is the result of long experience, careful study and exhaustive experiments by the Engineering Corps of the company. It is the best oil which modern experience and skill have produced. No oil made in a less efficient way can be equally efficient.

Polarine maintains the correct lubricating body at any motor speed or temperature. It protects every part of the motor subject to wear, minimizes carbon and increases power.

Nearly 7,000,000 gallons were used in the Middle West alone in 1914—a fact which proves superiority.

STANDARD OIL COMPANY
(INDIANA)
CHICAGO, U. S. A.

Polarine

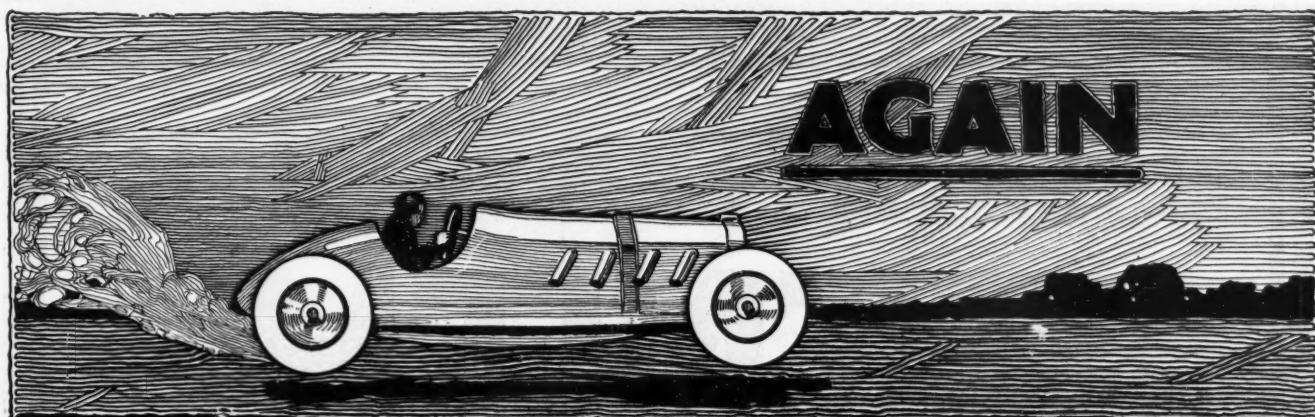
FRICITION REDUCING MOTOR OIL

Made in the largest plant of its kind in the world



Use RED CROWN Gasoline for More Miles per Gallon

(364)



BOSCH

MAGNETOS

WIN 500 MILE

SWEEPSTAKES

AT Chicago in the 500 Mile Race, Bosch Magnetos were on all cars that finished

THERE is the best reason in the world why no other ignition than Bosch is used by the prominent racing drivers—it is that none is as speedy, as efficient or as reliable. For real efficiency today, tomorrow or years from tomorrow.

Specify BOSCH. It costs a trifle more, but—

Correspondence always invited

BOSCH MAGNETO CO.

214 West 46th Street, New York

Chicago—Detroit

San Francisco—Toronto

Over 300 Service Stations



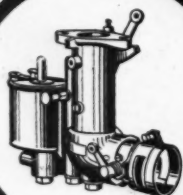
When Writing to Advertisers, Please Mention Motor Age

CLEAN SWEEP ZENITH WINS 1-2-3

Dario Resta - 1st - 97.6 M.P.H.
Porporato - - 2d - 96.5 M.P.H.
Rickenbacher - 3d - 95.8 M.P.H.

These three veteran drivers led the big field in the Chicago 500-mile classic, making the fastest sustained speed ever known.

The more exacting the demand the better does the Zenith rise to the occasion. It is in the Compound Nozzle—an exclusive and basic idea in carburetion.



ZENITH CARBURETOR CO.
DETROIT, U. S. A.



National

Special Red Tube

This is a raw sheet of fine selected Up-river Para gum ready for compounding after it has been washed, sheeted and loft-dried for four weeks in the National factory.

Selected Up-river Para is the only kind of rubber used in making National Special Tubes.

In its raw state Para is easily distinguished by its "smoked ham" odor. It closely resembles ordinary rubber stock in appearance, but for toughness and elasticity it has no equal, and when properly cured resists decay or deterioration for years.

We could compound ordinary good rubber for one-third the price we pay for this fine selected Para but—the result would be a National Special Tube in appearance only.

You can't make a silk purse from a sow's ear

There are no big secrets about making fine inner tubes any more than there are big secrets about making fine clothing or fine shoes. To make a high-grade commodity of any kind, fine material and fine workmanship *both* MUST be used.

It takes three months to make a National Special Tube

It is not alone fine rubber stock that makes National Special Tubes better. Our slow process of loft drying, our careful method of building and special vulcanizing process play an equally important part.

National Special Tubes are built entirely by hand. In place of using but one solid sheet of rubber as is the usual practice in common tube manufacture, many thin sheets are used.

One layer is applied, under ten tons of pressure, on top of another and each layer is rigorously inspected as it is applied. It is through this process that we eliminate all the tiny air pockets and bubbles, inherent to rubber. When these tiny air pockets and flaws are not carefully removed they become greatly enlarged when the tube is inflated and in use.

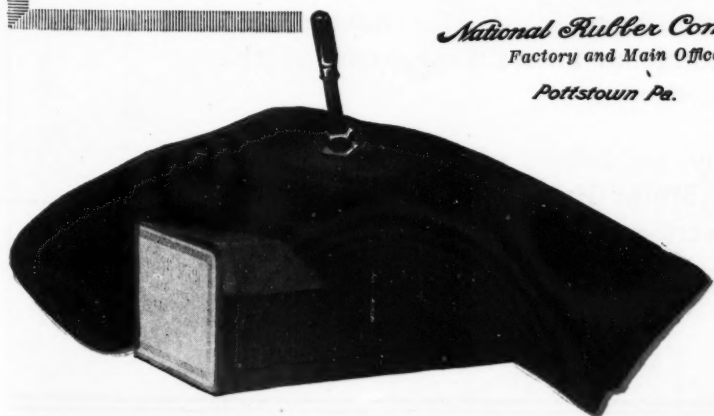
This is why most tubes are porous—why they leak several pounds of air daily. This is why they deteriorate so rapidly and "pinch-out" so easily.

This also explains why we are able to guarantee National Special Red Tubes to be non-porous and proof against deterioration for a full year.

Think this over

Before you buy another tube consider more than the initial purchase price. *More tires are ruined through the use of faulty, porous tubes than through any other cause.*

By using good non-porous tubes you obtain many added miles of service from your tires. Play safe. Get 100% tube value. Buy National Special Red Tubes.



National Rubber Company
Factory and Main Office
Pottstown Pa.

Size	Price	Size	Price
28x3	3.00	36x4	5.90
30x3	3.20	37x4	6.10
30x3½	4.10	34x4½	7.10
31x3½	4.25	35x4½	7.25
32x3½	4.40	36x4½	7.50
34x3½	4.70	37x4½	7.75
36x3½	5.00	35x5	8.50
31x4	5.20	36x5	8.70
32x4	5.30	37x5	9.00
33x4	5.50	39x5	9.50
34x4	5.65	37x5½	10.30
35x4	5.75	38x5½	10.50

When Writing to Advertisers, Please Mention Motor Age

Schemes

VS.

Business

How about it in your work—are you operating a scheme, or conducting a *regular business*?

Good business men have rather fixed ideas about schemes and schemers.

Advertising managers meet-up with schemes every day. Their sponsors are pretty clever gentlemen—they must be clever, to “put it over.”

One way to present and sell advertising is along regular business lines—definite quantity of quality circulation, on a price basis that is fair to all advertisers—circulation that is paid for, with appreciation for the publication that results from editorial *merit*.

Then there is the presentation that involves premiums, free space, coupons, and the time honored one of: “We will mail your advertising under postage, at no cost to you, to this-and-that list of dealers, etc., who are not subscribers to our publication.”

Schemes of this character would be in greater vogue if it were not for the sagacity and experience of most advertising managers and space buyers. Only the uninitiated fall for “premiums” and “give away circulation” that admit an inherent weakness of the publication making such offers.

The Class Journal Company, publishers of The Automobile, Motor Age, Motor World and Motor Print, conducts a *regular business* with 100,000 *paid* subscribers.

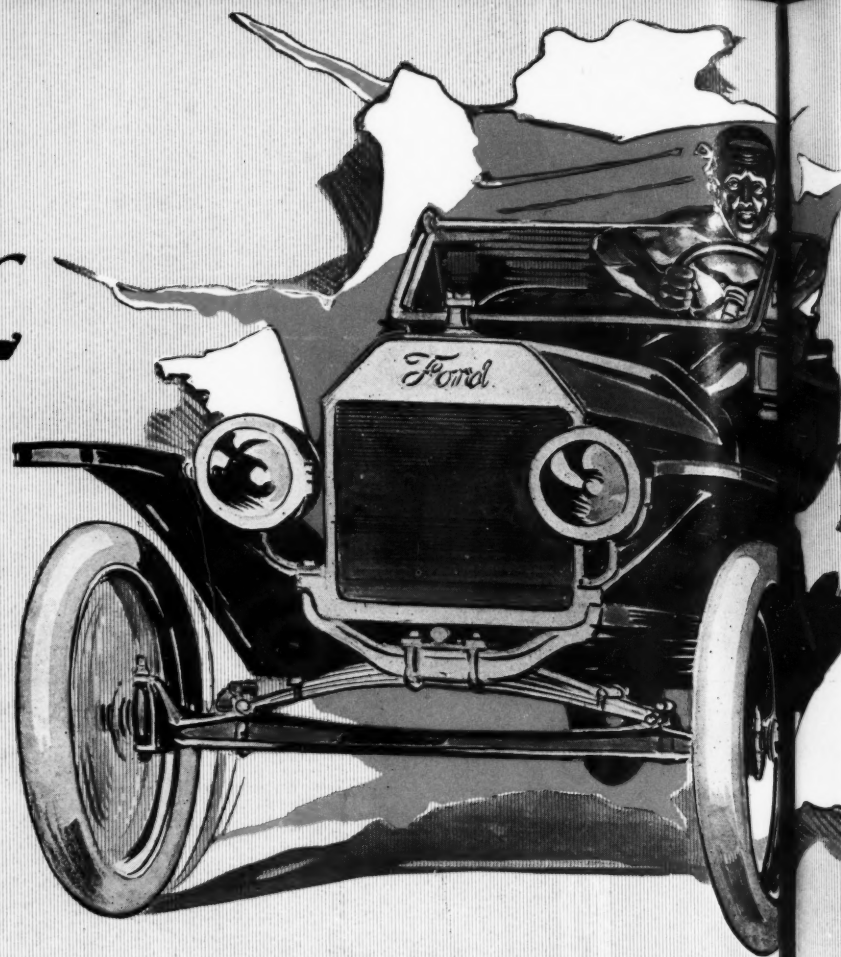


By invitation member of
Rice Leaders of the World
Association



The most startling
announcement ever
made in the FORD
starter field.

The Splitdorf- APELCO Single Unit System



Developed, Built and Guaranteed by the
Largest Exclusive Manufacturer of Au-
tomobile Electrical Devices in the World

Realizing the tremendous demand on the part of Ford owners for a high grade electrical starting and lighting system, we built a remarkably perfect system for this purpose—THE SPLITDORF-APELCO SINGLE UNIT SYSTEM.

The unequalled facilities of the SPLITDORF ELECTRICAL COMPANY, together with the APPLE ELECTRIC COMPANY, now a part of the great SPLITDORF-APELCO ORGANIZATION, made it possible to carry on that experimental development work on the largest, most comprehensive and scientific scale.

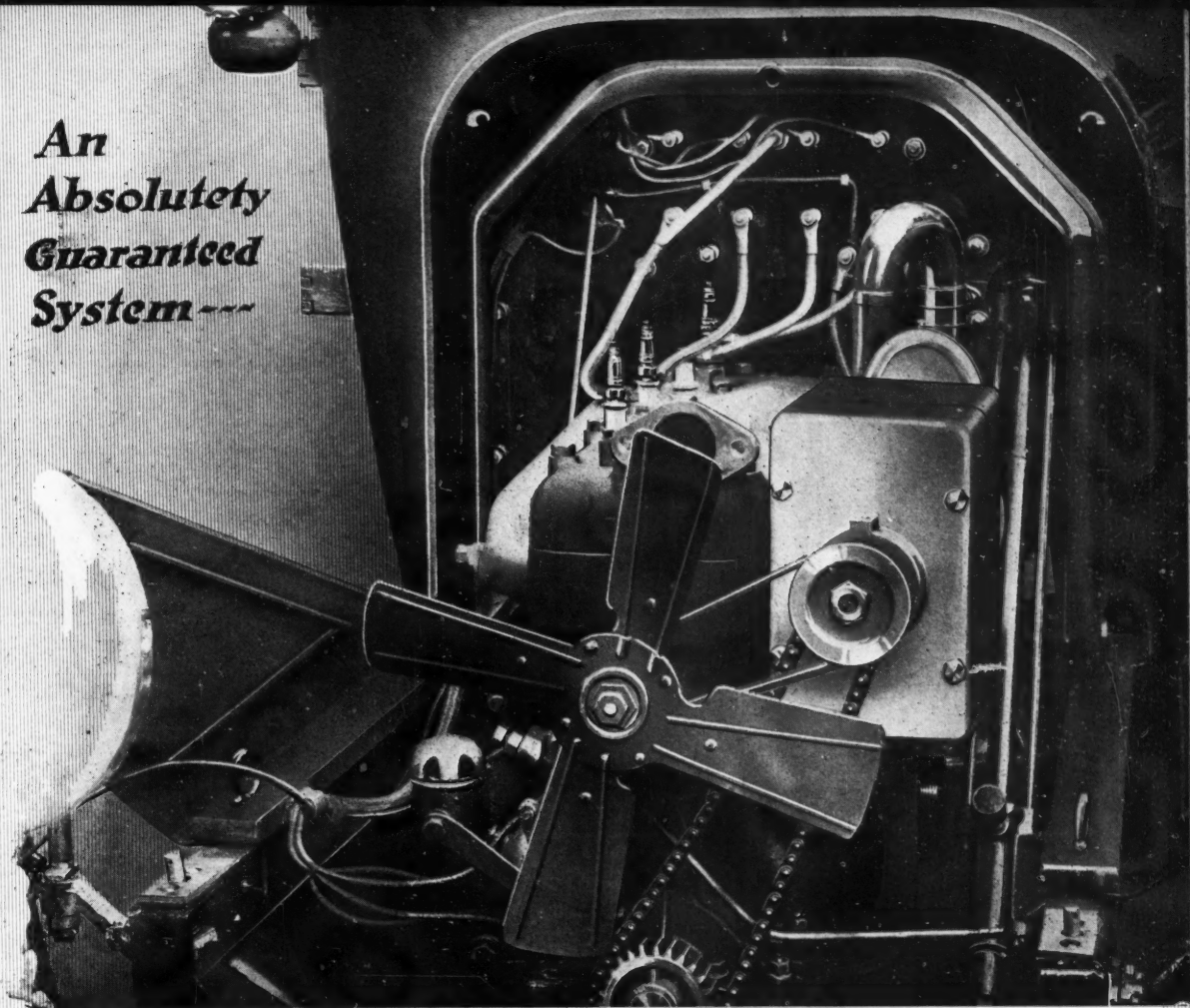
Two years ago our preliminary work was almost completed. Yet through all this period, before beginning actual manufacturing operations, this system was subjected to the most rigorous tests and abuse in order

to discover, if possible, any hidden weakness, or to find any means of improvement.

When the system was completed it was discovered that its expensive character dictated a retail price of \$85, at which price we expected to market it. But the tremendous demand, the volume production and the new method of marketing direct to dealers have made it possible to reduce that figure to \$65.

Now that our manufacturing facilities are in perfect shape and we are ready to make immediate deliveries, we announce the NEW SPLITDORF-APELCO SINGLE UNIT SYSTEM, confident that it is without a peer, and that it embodies a greater sum of starting-lighting essentials and more features of practical value than any other starting and lighting system ever developed for Ford cars.

An Absolutely Guaranteed System---

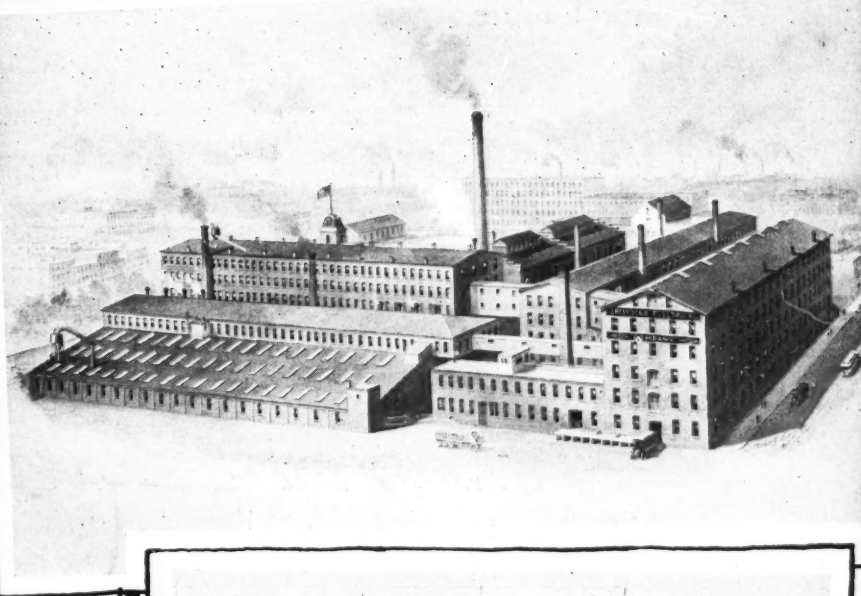


Things to Remember About the Splitdorf-Apelco Single Unit System

- 1—As a motor, the SPLITDORF-APELCO SINGLE UNIT SYSTEM is powerful enough, at economical current consumption, to spin the engine at sufficiently high speed to insure prompt and unfailing starting.
- 2—Working as a generator, this system is capable of producing ample current output at low speeds to maintain a fully charged battery, and provide for every current demand.
- 3—It has perfect current control at all speeds, eliminating the danger of an undercharged or an overcharged battery.
- 4—In line with the car on which it is designed to work, the SPLITDORF-APELCO SINGLE UNIT SYSTEM combines substantial construction with light weight—the lightest construction consistent with the work it has to do.
- 5—The installation of this system is extremely simple and once installed it gives the greatest accessibility and does not need to be removed for the ordinary repairs a Ford motor may require.

The SPLITDORF-APELCO SINGLE UNIT SYSTEM is the easiest to apply to a Ford car. Every provision has been made so that the original price of this system includes everything and so that the Ford owner has no additional expenses—all for \$65.

Then, by way of good measure, add the reliability of SPLITDORF-APELCO PRODUCTS, the completeness of SPLITDORF-APELCO SERVICE, and the enviable reputation of the SPLITDORF-APELCO ORGANIZATION for fair dealing.



The SPLITDORF- APELCO SYSTEM *is* RIGHT

The SPLITDORF-APELCO ORGANIZATION is the largest exclusive manufacturer of automobile electrical devices in the world. SPLITDORF-APELCO PRODUCTS have gained their fame by their efficiency, reliability and practical worth.

This reputation, together with our unlimited co-operation with the dealer to make our relations satisfactory and happy, should be the greatest inducement for the dealer's equipping his customers' Fords with the SPLITDORF-APELCO SYSTEM. The convenience with which the dealer can immediately obtain these devices from our many branches and service stations should be another inducement. And the fact that he may make **all the profit** instead of dividing with a territorial distributor, makes the SPLITDORF-APELCO SYSTEM the only system he can afford to handle.

The Ford owner, who, like thousands of other car owners, puts his confidence in SPLITDORF-APELCO PRODUCTS, is not only a wise man in that he is selecting the article which will give him the most continuous and satisfactory service—but he gets the device which involves no expense

for its installation and maintenance.

The dealer who prepares to handle this best and most needed Ford necessity need not invest a dollar. He may get the system he sells immediately, install it in the shortest time, and make all the profit himself.

SPLITDORF ELECTRICAL COMPANY

BRANCH HOUSES AND SERVICE STATIONS

ATLANTA...10-12 E. Harris Street
BOSTON...1112 Boylston Street
CHICAGO...64-72 E. 14th Street
CINCINNATI...811 Race Street
DALLAS...402 S. Ervay Street
DETROIT...972 Woodward Avenue

KANSAS CITY...1827 Grand Ave.
LOS ANGELES...1215 S. Hope St.
MINNEAPOLIS...34 S. 8th Street
NEWARK...290 Halsey Street
NEW YORK...3, 5 and 7 W. 61st St.

PHILADELPHIA...210-12 N. 13th St.
PITTSBURGH...5941 Ellsworth Av.
SAN FRANCISCO...1028 Geary St.
SEATTLE...1628 Broadway
TORONTO...469 Yonge Street

LONDON

PARIS

MILAN



People who understand motor car
quality know that the

PIERCE-ARROW

is notable for the quality of its equipment, as well as for its excellence in other respects. Nothing but the best is permitted to go into any part of a Pierce-Arrow Car. Pierce-Arrow Tops are and always were made exclusively of

GENUINE *Pantasote* TOP MATERIAL

THE NEXT TIME YOU SEE A PIERCE-ARROW notice the beauty of the top, even if the car has seen long service. If you ask the owner, he will doubtless tell you that the top not only looks well and wears well, but that in the rain it does not leak a drop.

A TOP MADE OF GENUINE PANTASOTE is evidence of the manufacturer's endeavor to reach the highest point of excellence in car building. GENUINE PANTASOTE does not fade or crack or become shabby, like cheaper top materials.

IT RETAINS ITS APPEARANCE of newness after long use, thus adding to the attractiveness of car.

ITS SURFACE BEING SMOOTH can be easily cleaned. Dust, dirt or grease stains do not injure or become imbedded in it.

OF COURSE IT WON'T LEAK. It has three separate, distinct and independent waterproofing sections.

GENUINE PANTASOTE TOP MATERIAL has been adopted as regular equipment on practically all of the most expensive cars.

WHEN YOU BUY YOUR NEXT CAR specify a top made of genuine Pantasote.

REFUSE SUBSTITUTES that are frequently offered to increase the dealer's profit at your expense.

"What's What in Top Materials" explains the entire top material question. Your name and address on a postal brings this interesting and informative booklet free.

The Pantasote Company

1705 Bowling Green Building

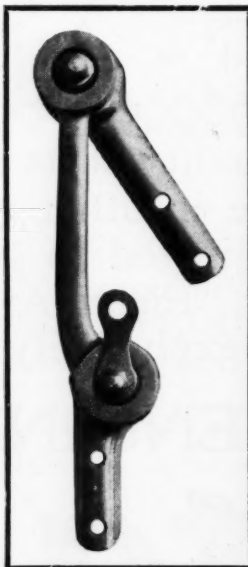
New York City



Put a Perfect Ventilating Rain-Vision Windshield on your Ford

For 1915 Fords with Cowl Dash

Rain-
Vision
Position



Ready to Attach

There's no need to pay \$10 or \$15 for a new windshield, when for \$5 you can transform the old one into a perfect ventilating, rain-vision shield.

The Illinois Automatic Windshield Hinge insures a cool stream of air circulating through the car these hot days and a sure, safe rain-vision protector.....

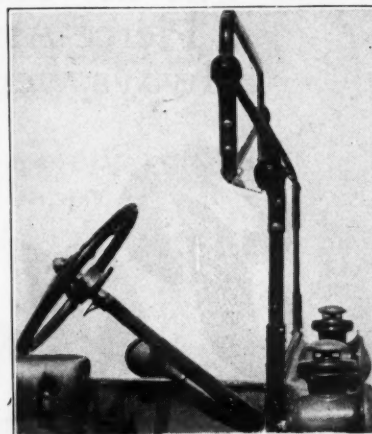
\$5

Illinois Automatic Windshield Hinge

The only windshield hinge made of tempered steel, and **guaranteed for the life of the car.** Fits any 1915 Ford with cowl dash. Easy to attach. Simple adjustment for perfect ventilation and rain vision. Use screw holes of old windshield. Richly finished in black enamel. Ready to attach. Price \$5 per pair. Write for free illustrated circular.

DEALERS—Big demand by Ford owners. Liberal discounts. Write

ILLINOIS BRASS MFG. COMPANY
11-17 South Desplaines Street Chicago



Venti-
lating
Position

Black
Enamel
Finish

"Exactly What You Wanted to Know, Told So You Can Understand It"

A Valuable Book for Owners, Repairmen, Drivers, Students and Salesmen

FIVE BOOKS IN ONE COVER
—512 Pages—217 Illustrations. Drawings, Diagrams and Charts.

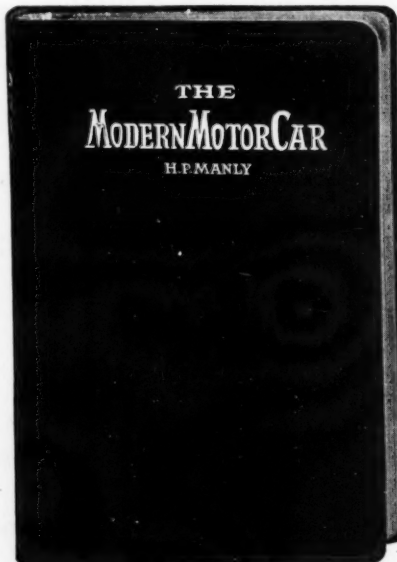
I

PARTS OF THE CAR—Their Construction, Use, Care and Repair.

Contains simple rules for performing every mechanical operation the car can ever need. Not only covers the newest developments, such as eight-cylinder engines, vacuum fuel feed, etc., but contemplated improvements from the makers of cars and parts.

II

MATERIALS AND SUPPLIES—How to Use, Buy or Make Everything Needed in Running the Car.



III

ELECTRICITY—Its Underlying Principles Interestingly Explained.

IV

ELECTRIC LIGHTING, ENGINE STARTING AND CONTROL—First Complete Explanation. Covers such things as electric gear shift, electric brake, Edison storage battery, new magnetos and new time saving methods of wiring.

V

IGNITION PARTS—Design, Construction, Care and Repair of Every Standard Form of Ignition Appliance as Well as Newest Adaptations.

INDEX

24 PAGES—Listing 1165 Headings Under Every Possible Classification.

"The Modern Motor Car"

A complete book on upkeep and repair. Brand new from cover to cover. Contains no history, out-of-date or obsolete matter. Written in non-technical language.

A money saver for every man interested in motor cars.

Bound in Black Morocco with Flexible covers, Gold Lettering and Polished Edges the MODERN MOTOR CAR sells for only **\$2.50**

THE CLASS JOURNAL COMPANY

900 MICHIGAN AVENUE, CHICAGO, ILLINOIS

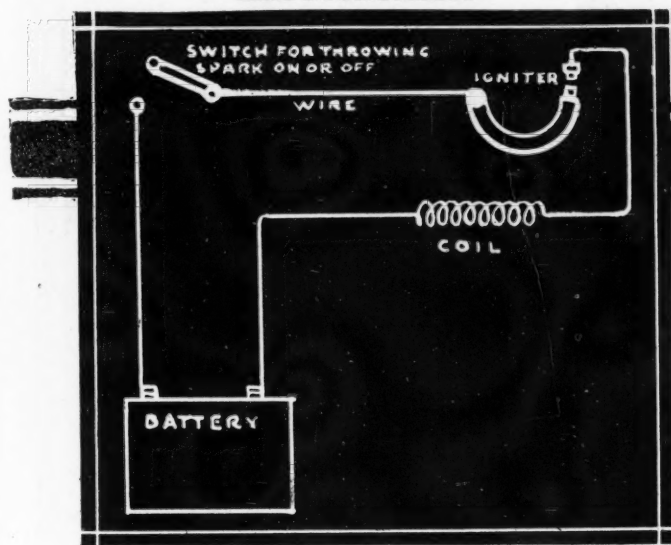
When Writing to Advertisers, Please Mention Motor Age

SIMPLICITY

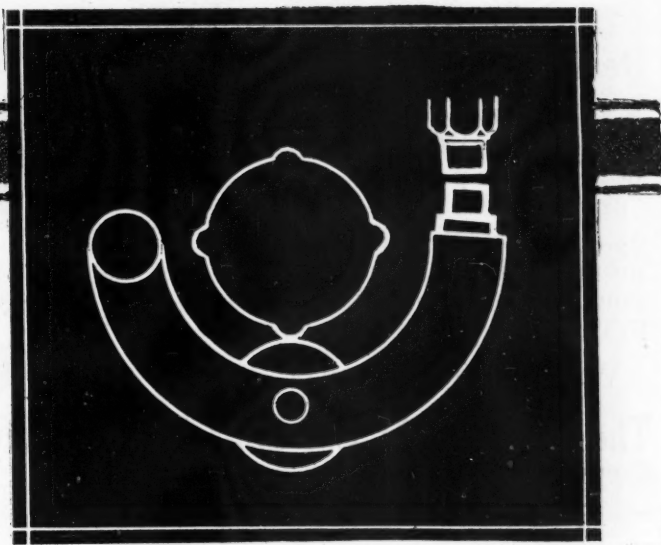
of

CONNECTICUT AUTOMATIC IGNITION

ELECTRICALLY



MECHANICALLY



In ignition, simplicity spells efficiency.

CONNECTICUT AUTOMATIC IGNITION employs the simplest form of circuit—nothing in it to restrain the full flow of current—nothing to impede thorough saturation of the coil. The electrical action is absolutely free from complications and as a result, not the slightest indication of electrical lag is present, even under the demands of a twelve cylinder motor working at excessively high speeds. In fact, no electrical lag can ever occur in CONNECTICUT AUTOMATIC IGNITION, because there is nothing in the circuit to cause it.

There is nothing like CONNECTICUT AUTOMATIC IGNITION—in action or results. The magneto circuit is of the same kind but the variable current curtails its efficiency at low speeds.

Other forms of ignition have been compelled to sacrifice both the simplicity and efficiency of their systems in order to minimize the danger of battery drainage.

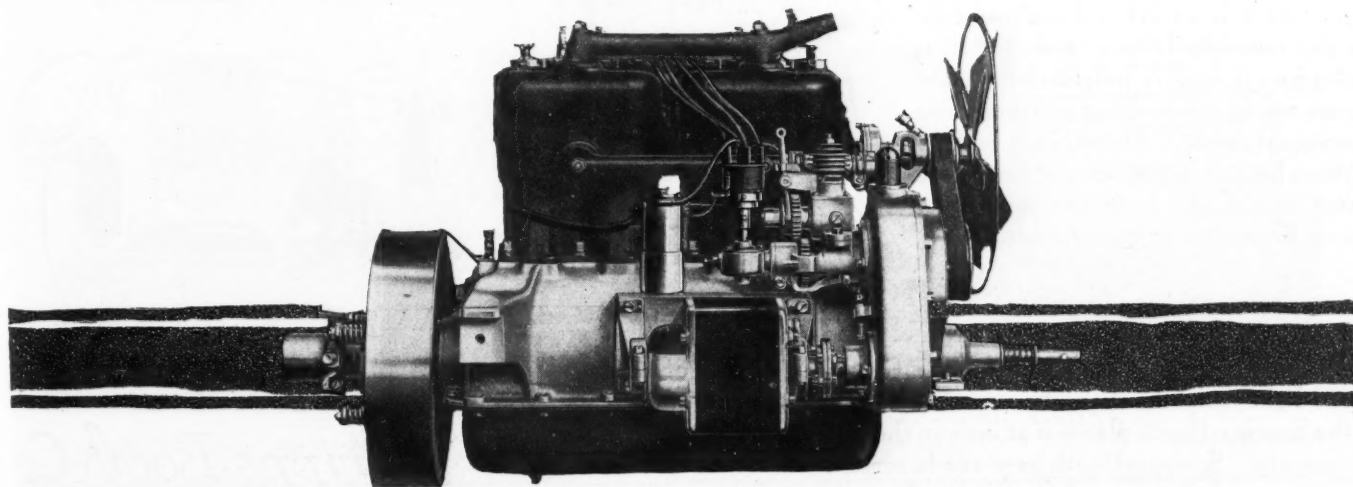
In CONNECTICUT AUTOMATIC IGNITION all mechanical action takes place in the breaker-box. The action which causes the make and break of the circuit is simple, direct and the most positive mechanical action known. It is the only action which eliminates mechanical lag. This is most important, especially in view of the trend toward high speed motors, because mechanical lag, inherent in spring, trigger or relay actions, is fatal to synchronous firing.

In marked contrast with the limited range of advance and retard due to the mechanical construction of the magneto, the unlimited range of manual control with CONNECTICUT AUTOMATIC IGNITION puts no restriction upon motor flexibility.

As a result of its simplicity CONNECTICUT AUTOMATIC IGNITION not only insures synchronous action at all times, but absolute freedom from mechanical troubles, which make constant service necessary.

Connecticut Telephone & Electric Company,

Meriden, Conn.



When Writing to Advertisers, Please Mention Motor Age

The New Garford Hand Operated Warning Signal

What About Your Warning Signal?

The Garford, hand operated, never fails

Did your warning signal ever fail? Next time, it may refuse to work at the critical moment —when life and death, or a smashed car hang in the balance.

Don't risk your life, your passengers' lives, and your valuable car. Equip today with the new GARFORD safety horn.

GARFORD never fails. Ask your dealer.

Dealers

\$3.85 for the new GARFORD is not a competitive "price." It is a logical list, at a fair profit, due to enormous production and demand. Get your share by handling the GARFORD. Nationally advertised.

Write for details today.

The Garford Mfg. Co. 2503 Olive St., Elyria, O.

Branch: The Garford Mfg. Co., Kansas City, Mo. Distributors: The Dean Electrical Co., Seattle, Wash.; The Dean Electric Co., Los Angeles, Cal.; Sumter Telephone Supply Co., Sumter, S. C.

\$3.85

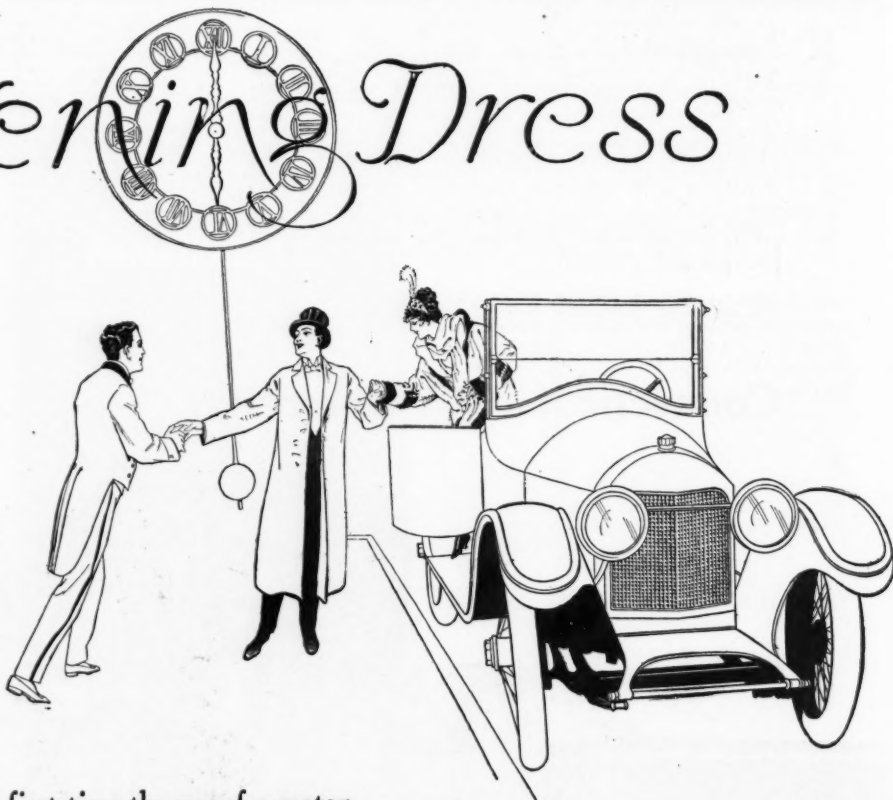


In Evening Dress

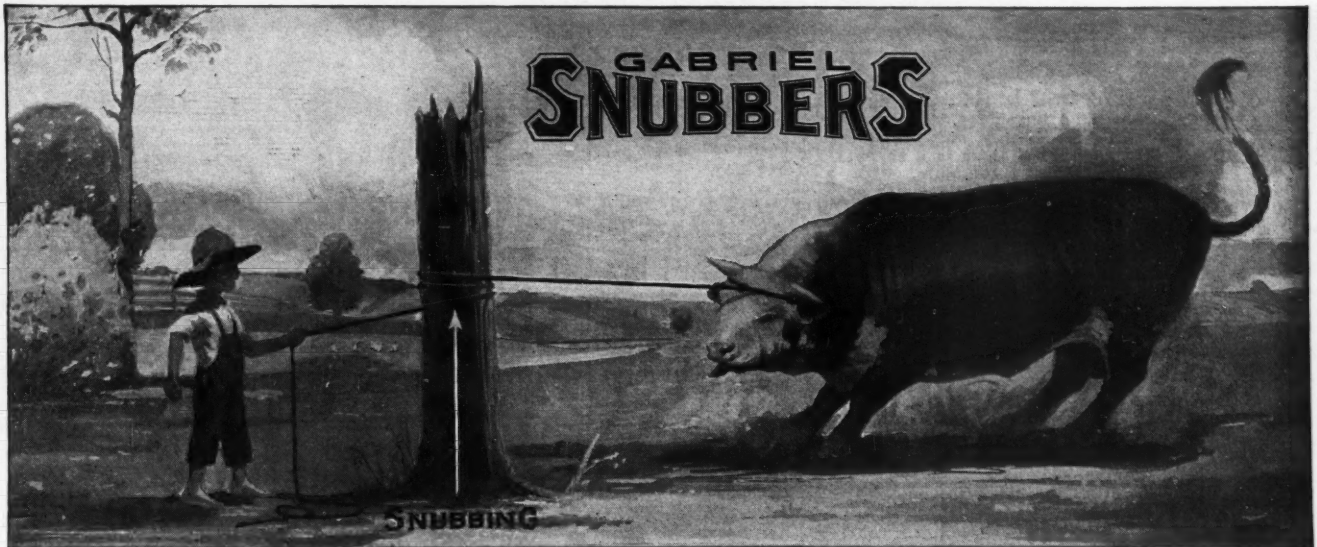
STYLE in clothes or motor cars is the result of a desire to appear at one's best and to indicate to one's friends that mental quality of knowing how which is only attained through knowledge. As it is an art to dress properly for the individual hour and occasion, so also does it require judgment to choose the car for each individual social or business requirement. Heretofore, society has been limited in its choice of luxurious motor cars to the large but sumptuous heavy limousine or touring car.

Scripps-Booth

luxurious light cars now allow for the first time the use of a motor car of light weight and handiness. The equipment, finish and beauty of the Scripps-Booth places it at once in the highest standard of motor-car society. Scripps-Booth cars are become the usual sight in line at receptions and those social functions where those of importance congregate, and recast all previous ideas of luxurious motor-car comfort.



*Scripps-Booth Co.
Detroit, Mich.*

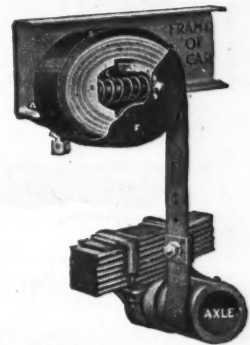


The Coil of Belting Inside the Snubber

acts like the coil of rope around the tree—every pull tightens the belting and creates a friction that prevents abrupt or excessive spring rebound.

The Spring inside the coil and a smooth band of brass between the layers of belting, graduate the friction and snub the rebound gently and firmly.

The Belting tightens in direct ratio to the tendency to rebound, thus ensuring practically the same degree of easy riding on rough roads as on smooth, whether the car be light or heavily loaded.



GABRIEL MFG. COMPANY, 1415 E. 40th St., Cleveland, Ohio

A \$600,000 business, developed in eight months

with our Conover Cowl-Windshield for Ford cars, shows conclusive evidence of merit. Sold by all the best dealers the country over. Used on 1912, 1913, 1914 and early 1915 Model T. Thousands of Ford owners are using them and praising them. The demand is country wide. Wonderfully improves Fords. Worth all they cost for looks alone. When riding in hot weather you don't have to be cooked. You open the bottom ventilating section and are cool and comfortable. When it storms you open the rain vision section and look under. It makes driving safe and convenient, and at the same time gives protection from the elements. It is an all year proposition. Our Universal shield for the new 1915 cowl-dash Ford has all the above advantages. It is the final touch of elegance and refinement that brings the new Ford right up to date. No better shields made at any price.



F. O. B. Adrian Mich., \$15.00

Carried in stock, prompt shipments.
Capacity 300 per day.

CONOVER COWL WINDSHIELD

Bolts on without fitting

UNIVERSAL WINDSHIELD

takes place of plain old fashion folding shield that comes with the new 1915 cowl dash Ford.

Complete with brackets
F. O. B. Adrian, \$10



PAGE WOVEN WIRE FENCE CO.

Windshield Department

ADRIAN, MICH.

meaning that when it isn't raining the wind is blowing a hurricane. Attempting to play golf here to-day was something like trying to light a cigar in a seventy-five mile an hour automobile, with a slight difference that it is sometimes possible to light the cigar.

The wind did not discourage the field, however, and more than eighty hard-
vers braved the wind and cold.



No. 200. Combination "PRESTO" Cigar Lighter and Lamp. Complete, with holder, \$3.50.



No. 240. Automatic cord winder, \$2.50, attached to (No. 202) Cigar Lighter, \$2.50.



No. 261. Inspection Lamp. Full 3" reflector, 10 ft. cord, regular battery terminals, \$1.

It Is Always Possible to Light Your Cigar With a "PRESTO" Electric Cigar Lighter

When Attached to Your Battery

—no matter how hard the wind blows, or how fast your car is running. No flickering. No danger of fire. Pure platinum lighter tips that last.

"PRESTO" Specialties

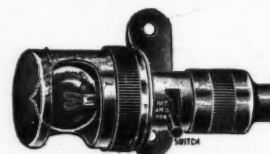
Trouble lamps, inspection and dash lamps; cigar lighters, etc.—all electric—make for absolute comfort and safety on the road.

Dealers—Handling "PRESTO" Specialties pays. Write for illustrated catalog and discounts.

METAL SPECIALTIES MFG. CO.

730-738 W. Monroe St., Chicago, Ill.

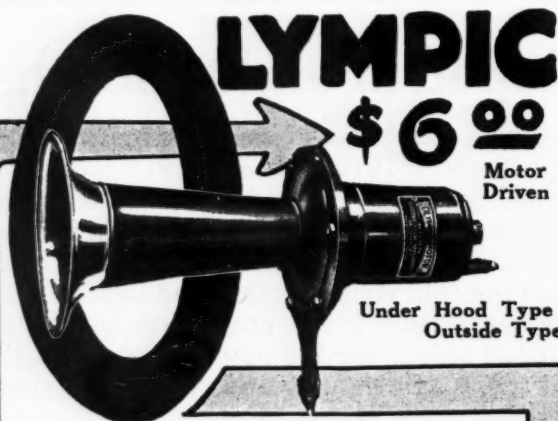
604 Mission St., San Francisco—1779 Broadway, N. Y. City



No. 650. New Cowl Dash or Step Light with switch and 6 volt 4 C. P. Tungsten Bulb, \$1.25.



No. 1020. "PRESTO" Electric Hand Lamp, with metal battery container. Use ordinary dry battery. (Without battery, \$1.25.)



Under Hood Type \$5
Outside Type \$6

Don't Pay More For a Motor Driven Horn

The OLYMPIC does the work of electric horns that sell for 3 times its price. The OLYMPIC can't be surpassed for service or guarantee. Its achievements lead them all. Easy to operate, and effective.

Order your OLYMPIC today.

Our famous OLYMPIC Vibrator Horn with which 75,000 cars are now equipped, price \$2.50. The best horn of its kind ever made.

Dealers—OLYMPIC is the most for the least money—and dealers' discounts are liberal. Write at once.

ELECTRIC SPARK APPLIANCE COMPANY
140 Imlay St., Brooklyn, N. Y.

THE F. E. CASTLE COMPANY

Western Distributors
872 Woodward Avenue Detroit



Bull Dog Quality

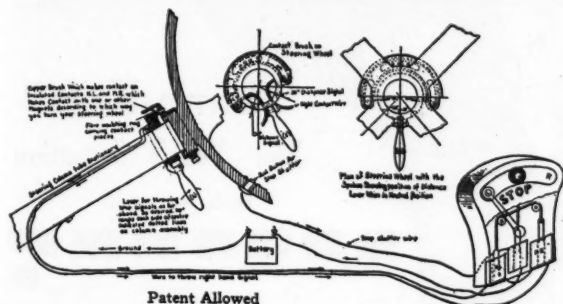
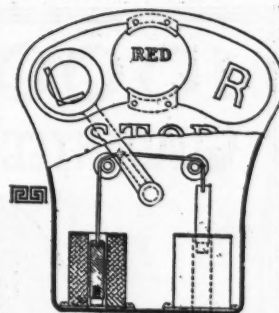
Represents the Highest Skill in Rubberized Fabrics

Mohairs, Serges and Numotor Fabrics for the best in Automobile Tops, Curtains, Upholstery. Combines the latest modes to please the most discriminating, yet of a quality that the most careful manufacturer is pleased to guarantee.

Send for Samples

L. J. MUTTY CO.
BOSTON, MASS.

Can You Imagine What It Would Do To Your Car To Have The Car Behind Smash Into It, And Can You Imagine What It Would Cost To Repair It, How It Would Permanently Disfigure Your Car, And How Troublesome And Impossible It Would Be To Collect Any Damages?



Patent Allowed

We will be pleased to tell you all about this simple device if you will ask us.

The Price Is \$12.00 Complete

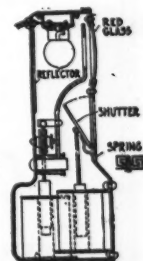
But you can avoid this kind of most prevalent accident by equipping your car with

Pomeroy's AUTOMOBILE REAR SIGNAL Indicator

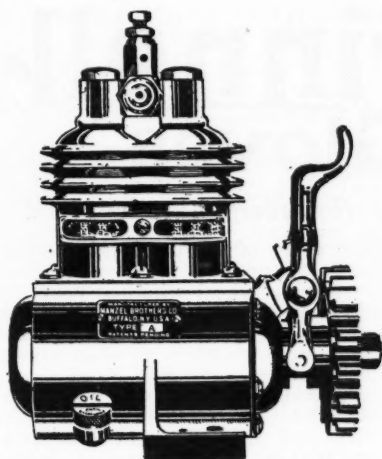
Automatically Controlled by the Steering Wheel

This simple electrical device automatically registers your turns right and left, telling the man behind what you intend to do, and it also provides a simple control lever on the steering wheel with which you can indicate your intended movements before you make them. With a button on the steering wheel you flash the word "STOP!"

This durable and handsomely constructed device contains the red light required by law, carries your number plate and illuminates it, and furnishes the most needed insurance on the rear end of your car.



B. H. Pomeroy, M. E., 10 Jones Ave., Rochester, N. Y. Patents Pending



We carry in stock fittings for the following cars:

Abbott-Detroit, Buick, Cadillac, Carter-car, Case, Chandler Six, Chalmers, Cole, Dodge, E.M.F., Enger, Franklin, Grant, Hudson, Imperial Six, Jeffery, Kissel-Kar, Maxwell, Michigan, Mitchell, Moon, Oakland, Oldsmobile, Overland, Packard, Paige-Detroit, Rambler Cross Country, Reo, Simplex, Speedwell, Studebaker, Stutz, Velle, Westcott and others. Also for Lippard Stewart, Stewart and Buick Trucks.

Buy a Tire Pump as Carefully as You Would an Automobile

If every motorist insisted on getting as much value per dollar expended when he bought a tire pump as when he made the larger purchase, the

MANZEL ENGINE-DRIVEN TIRE PUMP

would sweep the market and swamp our factory.

For our two-cylinder engine-driven pump is built for value—value in the scientific correctness in design; in the unvarying mechanical accuracy of construction; in the high quality of its component materials; in its precision of finish—all making a composite of mechanical virtues that raises our pump to the highest power in value.

Our dealers are instructed to stand by our pumps with a most liberal trial offer and guarantee. Try it on your car for thirty days—that means another sale, for its performance will delight you, and the low price, quality and efficiency considered, is our final, sales-clinching argument.

\$20 Complete with all fittings, including 15 feet of air hose, and pressure gauge that is always accurate

MANZEL BROS. CO.

Factory and General
Sales Offices:

306 Babcock St., Buffalo, N. Y.

New York Office—U. S. Rubber Bldg., Broadway & 58th St.

Portland, Oregon, Office—213 Gerlinger Building

San Francisco Office—356 Market St.

DISTRIBUTORS IN ALL IMPORTANT CENTERS

**MANZEL FORD
MODEL**

For Ford Cars there is a Manzel Engine-Driven Pump that is absolutely ideal from every standpoint—design, workmanship, ease of installation, durability and price. Complete with 12 feet of air hose, gauge and gears.

\$7.50

When Writing to Advertisers, Please Mention Motor Age

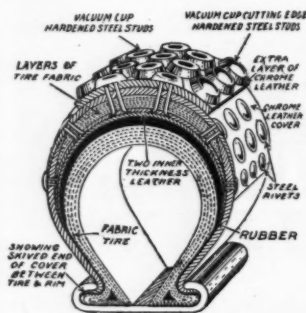
10,000 MILES GUARANTEE BACKS THIS TIRE

Bricton Pneumatic Tires



Try Them at Our Expense

TRY Bricton Pneumatic Tires at our expense. Don't pay until you are satisfied. At our risk find out for yourself what wonderful service Bricton Tires give—how resilient and easy riding they are. Get rid of punctures, blowouts and rim cuts. Bricton Tires are rut proof, oil proof and gasoline proof. They are sold under a specific 10,000-mile written service guarantee.



Your Tires Rebuilt the Bricton Way

If the fabric in the tires you are now using is in good condition, we can take them, make them proof against rim-cutting, punctures, blowouts, side wall breaks, skidding, ruts, oil, and give thousands of miles additional service.

Sign and send back coupon for full information and details of our liberal Free Trial Plan

THE BRICTON MFG. COMPANY
1275 Bricton Building BROOKINGS, SO. DAK.

Mail Back This Coupon

Bricton Mfg. Co., 1275 Bricton Bldg., Brookings, So. Dak.

Please send me full particulars about Bricton Tires, explain your free trial plan, also explain how my own tires can be rebuilt the Bricton Way.

Size of Tires _____

Name _____

Address _____

Here, Sir! for Summer!



"Limp-Kuff"

The Year's Sensation

Style No. 4446

This distinctively "classy" and *serviceable* glove with a soft, limp cuff which protects the sleeve and shuts out dust and wind is so soft it wrinkles down naturally on the wrist or may be pulled over the sleeve—the gloves are easily crushed away in one's pockets. Ventilated or unventilated. With or without adjustable strap fastener at wrist. Comfortable and smooth. The "glove indispensable" for motoring, driving, riding, etc.

Grinnell Gloves

Best for every purpose

These gloves have a lot of exclusive motor-comfort features. The "Grip-Tite" insures a non-slip grip on the steering wheel whether your car is going 40 miles an hour or 89. Then the "Ventilated Back" and "Rist-Fit" improvements put Grinnell Gloves away ahead in comfort-giving and wear-resisting qualities. Grinnell Gloves are made of soft, velvety coltskin—tough as rawhide. You can wash them easily in water or gasoline, and they dry out like new. Unaffected by steam, heat, water, gasoline, heavy oils, etc. **Guaranteed not to crack, scuff, shrink or harden.** 900 styles—all prices—at good dealers everywhere.

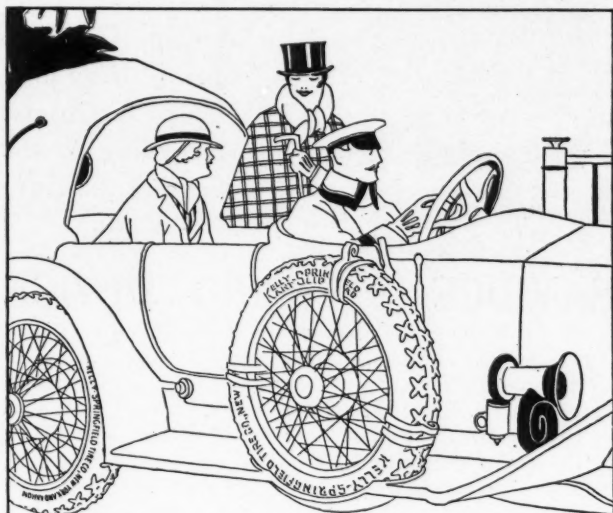
If your dealer hasn't them, send us his name, stating your size, and we will send a pair through him on approval. Glove book and leather samples free. Write today, giving your dealer's name.

Morrison-Ricker Mfg. Company
64 Broad Street (Established 1856) Grinnell, Iowa

Style No.
V-4400

Coltskin
gloves with
ventilated
backs for
driving and
all outdoor
use.





Kelly-Springfield

tires give you their mileage on the road—not in adjustments. The best evidence of this is the fact that in 1914 the total adjustments on Kelly-Springfield tires were less than 1% of sales. In the rare cases where they are required, adjustments are now made on the basis of the following very liberal mileage:

**Plain tread, 5,000 miles;
Kant Slip, 6,000 miles.**

In Ford sizes, plain tread, 6,000 miles; Kant Slip, 7,500 miles.

**Kelly-Springfield Tire Co.
Akron, Ohio**

BRANCHES IN ALL PRINCIPAL CITIES

"A Twist of the Wrist"



—that's how simple it is to put in or take out the Henemier Valve--no tools required

and so simple in construction that there's nothing to get out of order.

The Henemier Valve is the long looked for improvement on one of the most vital parts of the automobile.

The best tire in the world can't produce its maximum mileage unless the "air" is kept in the tire and kept at the right pressure after it is in. And the everyday tire valve, which hasn't changed a bit in form or principle since it was first made for bicycle tires, doesn't keep all the air in the tire all the time.

The HENEMIER VALVE-INSIDE

MADE UNDER U.S. LETTERS PATENT



keeps the air in all the time—keeps the pressure up all the time—keeps it properly inflated all the time.

Fits all Standard Stems and Pump Connections

Accepts and discharges air faster than any other valve.

Write for sample—test it yourself—then you will have a pretty good idea of what we are telling you to tell your customers to buy.

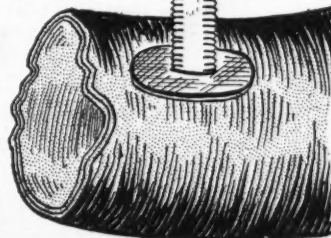
The illustration will give you a very fair idea of the Henemier Valve, and when you send for the sample you will be able to appreciate the advantages of the Henemier Valve over all others in just about one-half of a minute.

Packed 100 in a box to retail at 5c each. Write for samples and trade discounts today to

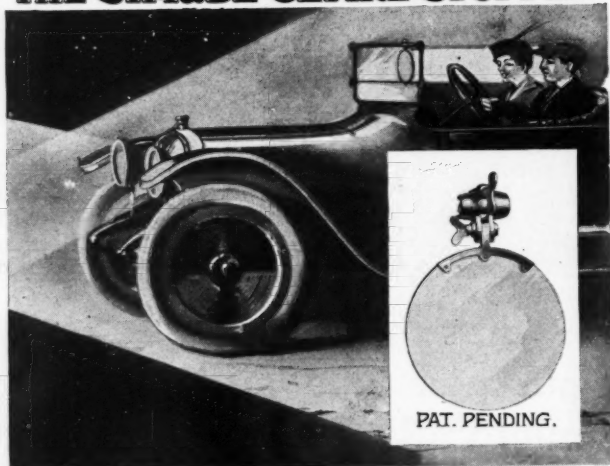
**THE RIESS
MFG. CO.**

Sole Licensees and Makers

**1692 Broadway,
NEW YORK, N. Y.**



THE STAUDE GLARE STOPPER



The Staude Way

When the motorist is protected by and looking through a Staude Glare Stopper the blinding lights of the approaching automobile are modified to a soft glow. The entire road can be seen with perfect ease, and there is no danger of accidents resulting from driving ahead with one's eyes blinded.

We have solved the Glare Problem at the right end without decreasing the light necessary for safe driving.

The beautiful, rich, amber colored glass looks fine and lends tone to any car.

The Staude Glare Stopper is guaranteed to protect the eyes of the automobile driver from the strongest approaching light in night driving or sun dazzle during the day.

If it does not do this, return the Glare Stopper and your money will be refunded.

The Staude Glare Stopper

The nickel plated clamp will fit on the windshield of any make of car. The heavy clear amber-colored crystal lens glass, 6 1/2 inches in diameter, dissects the light rays and makes driving at night a constant pleasure instead of a constant fear.

Retail Price

\$2.50

Parcel Post C. O. D. or at all first-class dealers

To Dealers: The STAUDE GLARE STOPPER is one of the fastest selling automobile accessories on the market today.

The STAUDE GLARE STOPPER is not a cheaply made and "tinnie" looking affair. It is made of the best polished crystal amber glass—and you know ground and polished glass is always clear and can never fade or curl like celluloid.

E. G. Staude Manufacturing Co.

2675 University Ave., St. Paul, Minn.

Dear Sirs:

Please send me by Parcel Post C. O. D. \$2.50 prepaid one complete

STAUDE GLARE STOPPER

with the understanding that I may return it if unsatisfactory and get my money back.

Name

Address

City State



For Your **FORD \$4.90**

SAVIDGE STEERING DEVICE

Meets the Requirements of the Driver

Takes the wobble out of front wheels. Acts as shock absorber on steering gear. Eliminates rattle and vibration. Saves tires. Gives you the perfect, positive control of the \$5000 car equipped with worm steering gear.

Manufactured under patents owned and controlled by us. Remember the name—Savidge. Avoid imitations.

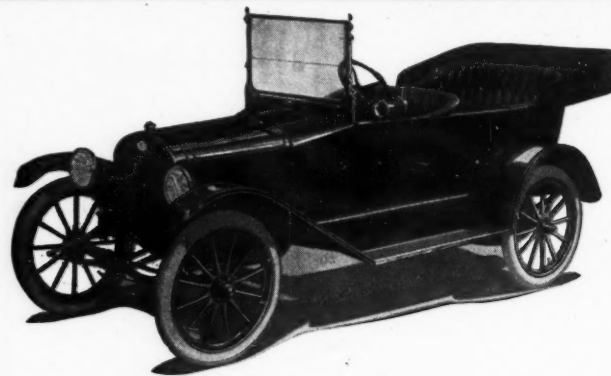
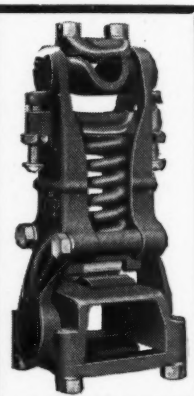
Simple Sturdy Safe Silent

Easily applied. Sold under rigid guarantee. **Price \$4.90.** Soon pays for itself in repair bill savings. Order now! You run no risk.

Every Dealer

who has ordered one to try has ordered more. Actual tests prove Savidge superiority. Be a Savidge dealer. Sell the best. Liberal proposition. Write Now!

Savidge Steering Device Co.
502 Murphy Bldg. Indianapolis, Ind.



METZ '25'

The Quality Car

\$600 Equipped Complete

Including

Gray & Davis Electric Starter and Electric Lights

This new Metz Touring Model is a man's car, every inch of it; but it pleases the ladies, too. It has the impressive style and the luxurious finish which they so much admire, and is so simple in operation that they can safely drive it.

In addition to electric system, equipment includes rain-vision windshield, instant one-man top, heavy tufted upholstery, deep cushions, 32-inch wheels, 3 1/2-inch Goodrich clincher tires, Bosch magneto, Hyatt roller bearings, built-in gasoline gauge, speedometer, signal horn, tools, etc., and fibre grip gearless transmission—which eliminates all clutch and gear trouble.

We want to hear from Dealers

Write for particulars and New Catalog "K"

METZ COMPANY, Waltham, Mass.

When Writing to Advertisers, Please Mention Motor Age



Arguing with adjusters is bad for both the tire user and the tire dealer.



Geared to the Road

The users of

Miller GEARED TO THE ROAD Tires

don't waste their time arguing with the adjuster. They get what they pay for in the first place. That's one reason for the tremendous popularity of Miller tires—that's why the Miller dealer considers the agency for Miller tires a valuable asset.

He knows that the tires which build up a permanent, profitable business for him are tires that are not built for replacements; but to give more mileage on the road than any adjuster can replace in the store. His men spend their time selling tires and not arguing with customers about short mileage.

The Miller Method of building tires retains the natural vegetable wax and oil in the cotton fabric, and the rubber's native toughness. That's why Miller tires give the most wear on the road.

If you're not a Miller dealer it will pay you to investigate the Miller "One Dealer in a Town" sales plan.

The Miller Rubber Co.
Akron—U. S. A.

Pyrene TRADE MARK FIRE EXTINGUISHER



At the
Indianapolis
Speedway
Race

Every car entered in this great race, including the one driven by Ralph De Palma, the winner, was equipped with a Pyrene Extinguisher—the standardized automobile protection against fire.

Saves 15% on Auto. Insurance

So well satisfied are the Insurance Companies with the QUALITY of fire protection furnished by PYRENE, that they have made this reduction in the cost of a policy on a Pyrene protected car—the Aetna Accident and Liability Company and the Automobile Insurance Company, of Hartford, Conn., having led the way. Save your car—and save on your insurance.

During the race, one car caught fire, due to an overheated exhaust pipe. It was extinguished by the mechanic, while the car was going at full speed, and a signal was given by the driver to the pitman to indicate that the Pyrene Extinguisher might need refilling.

So necessary to the races is considered PYRENE that they have included a signal to indicate the need of a re-charge for a PYRENE Extinguisher, the same as they indicate the need of oil or gasoline.

The motor and aircraft equipment of the British Army and Navy is provided throughout with Pyrene.

Hardly an hour passes, without an automobile or a garage being saved, somewhere, by a Pyrene Fire Extinguisher.

See Pyrene display in Palace of Machinery at Panama-Pacific Exposition

Brass and Nickel-plated Pyrene Fire Extinguishers are included in the lists of Approved Fire Appliances issued by the National Board of Fire Underwriters, and are Inspected, Tested and Approved by, and bear the label of, the Underwriters' Laboratories, Inc.

Write for booklet "The Vital Five Minutes."

PYRENE MANUFACTURING CO.

52 Vanderbilt Ave., NEW YORK

Distributors for Great Britain and the Continent: The Pyrene Co., Ltd., 19-21 Gt. Queen St., London, W. C.



Big Profits Made Grinding Cylinders!

Garagemen—Repairmen: Make scored cylinders of the cars you overhaul good as new. True up the cylinders if they are worn and thus increase motor power. Make good profits and satisfied customers. Hundreds of others doing big business.

Acme Cylinder Grinder

Quickly Pays for Itself

Can be attached to any lathe. ACME has same advantages as large cylinder grinding machines costing \$1300 to \$2000. The price of the ACME is within reach of every progressive garage and repairman. Guaranteed for 1 year.

ACME does not require the cylinder to be rotated. Grinds 4's, 6's, 8's, 12's just as easily as single cylinders.

Are You Getting the Profitable Cylinder Grinding Business in Your Town?

Constructed of best materials. Anyone can operate it. Easily adjusted.

FREE BOOKLET Write for it. Contains full details. You want to make more money. Here's the way.

The Acme Grinder Company
Minneapolis, Minnesota

6000-Mile
Adjustment;
Non-Skid
to the
Very
Last
Mile



The MIDGLEY Tire

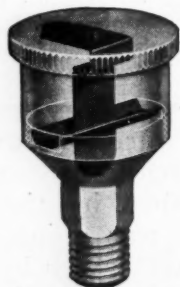
Patented Wire Tread

The visible quality of The Midgley makes it a quick seller. Its long mileage, permanent non-skid protection, and low cost per mile of service absolutely assure its repeating powers. And, because it is radically different from all other tires, the business you build upon it can never be taken from you. It is non-competitive in principle and price. Nationally advertised. Write immediately for dealer's terms and for Booklet No. 11.

Midgley Non-Skid, Plain Tread and Inner Tubes
Manufactured Only by

The Midgley Tire & Rubber Co., Lancaster, Ohio

304



KLICKET
Ratchet Grease Cup
"HEAR IT KLIK"

A New One Free If Broken or Lost

One set of KLIKET Ratchet Grease Cups is guaranteed to outlast any car. You will never have to buy another grease cup. We replace any KLIKET if you lose the cap or any part breaks.

You can catch the thread as easily in the dark as in the daylight. For it "clicks" as soon as the thread engages and at every quarter turn. You know just how far you turn it down. Saves grease and insures perfect lubrication.

Sample on Approval Send 25c for sample, postpaid. Be sure to give inside diameter of cap, size of pipe thread required on bottom of cup or diameter of bearing hole. Your money returned if unsatisfactory. Dealers' proposition especially attractive. Good profit—big demand—handsome free display outfit. Write for particulars.

AMERICAN STAMPING COMPANY, 304 Burchard St., Battle Creek, Mich.

Ford Special: Replace both steering knuckle oil cups with brass Klickets for 50c, postpaid

(2)



Twitchell

Air Gauge

The New Positive Lock Stop

feature renders absolutely impossible the registration of any but the exact pressure in your tires.

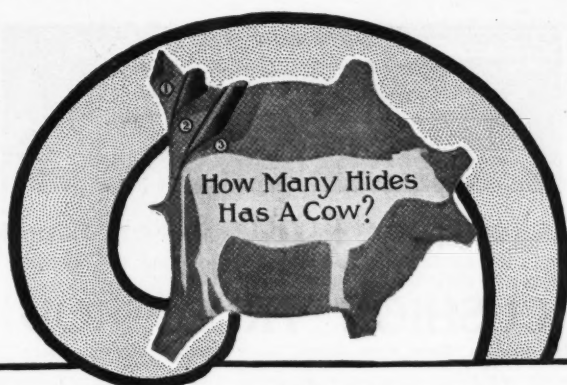
Don't Guess

Tires inflated to forty pounds look and feel exactly like tires containing eighty. The only way to tell the exact air pressure in your tires is by means of a TWITCHELL gauge.

Price One Dollar

For Sale by Jobbers, Dealers and Garages, or

THE TWITCHELL GAUGE CO.
1201 MICHIGAN AVE., CHICAGO



ANSWERED briefly, it has several, after the tanners complete their work. The outer or grain side makes strong, durable, serviceable, attractive covering material. The thin "sides" split from the whole hide are processed to resemble genuine grain leather. "Splits" are weaker, less durable, and cost more than the superior **DU PONT FABRIKOID** Motor Quality. Registration of 1914 cars shows over 50% were upholstered with improved substitutes for split leather. Make sure your car has **FABRIKOID MOTOR QUALITY** and so eliminate upholstery problems.

For samples of **FABRIKOID** Motor Quality, facts about leather and names of cars upholstered in **FABRIKOID** write to



**DU PONT
FABRIKOID
COMPANY**

Wilmington, Delaware



Canadian Factory
and Sales Office
Toronto, Ont.

A Standard Name

The test of time inevitably evolves a certain name or trademark that becomes a standard by which all other products in the same field must be judged. With this honor goes proportionate responsibility.

The integrity of the name K-W prohibits exaggerated claims. In the Ford accessories field there is one name known to the owners of Ford Cars as the standard—a name they think of when Master Vibrators are mentioned. The K-W trade-mark that goes on every K-W product is the symbol of quality, service and efficiency.



Master Vibrators

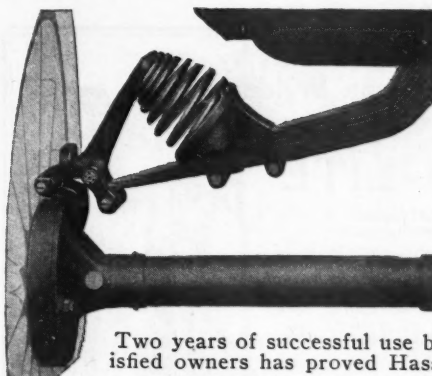
are sold by reliable dealers, everywhere.

**\$15 with regular Kick-Switch
\$16 with Yale Auto Lock Switch**

Anyone of the 125,000 users of K-W Master Vibrators will tell you that they get perfect ignition because their master vibrator gives a hot, fat spark, timed accurately.

Illustrated literature on request

THE K-W IGNITION CO.
2835 CHESTER AVE. CLEVELAND, OHIO, U.S.A.



HASSLER

**SHOCK
ABSORBER
FOR
FORD
CARS**

Two years of successful use by thousands of satisfied owners has proved Hassler superiority for

Easy Steering, Safe Driving, No Rebound, No Tossing

The large conical springs do not support the direct weight of the car. Hassler patented lever construction in combination with the regular leaf springs gives absolute riding comfort. Eliminates whipping about, tossing and side sway. Saves tires. Protects the motor from jolts and jars.

Easily and quickly applied.
Sold under rigid guarantee.
Write for illustrated folder.

\$20 for a
set of 4

Dealers, Write Now!

for complete information and attractive, exclusive territory proposition. Not sold through jobbers. We protect you.

ROBERT H. HASSLER, Inc.
INDIANAPOLIS INDIANA

Cutting This Coupon Means Car Comfort— Car Economy and a Saving! to You of \$20

Wherever you turn this year you find that more men who drive heavy type cars are using the Standard



because C. C.'s are most efficient—actually check the harsh rebound—produce the luxurious ride.

C. C.'s are the steel triple coil type—are long wearing—easily attached—save many times their cost in tires and retard car depreciation. The wonder of everybody is that although better than our popular 1914 model, they sell for \$20.00 per set less.

Set of two for heavy car.....\$10.00
Set of two, Ford type..... 4.50
Set of four, Ford type..... 8.00

We publish an interesting booklet called "C. C. Because—" It's worth your reading. Send for it. Compare C. C. with any other Shock Absorber—then act. Just fill out and mail this coupon.

Cox Brass Manufacturing Co.

Established 1872 Dept. A, Albany, N. Y.
Branches or distributors in all principal cities in U. S. A.

COUPON

Cox Brass Manufacturing Co.
4 North Pearl St., Albany, N. Y.

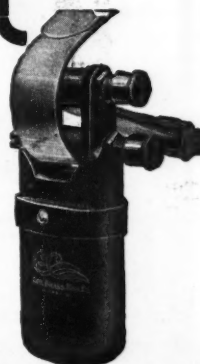
As per your special offer in Motor Age, please send me your booklet "C. C. Because—" together with the name of your dealer in this vicinity.

Name

City..... State.....

Make of Car.....Year.....

Model Body.....



When Writing to Advertisers, Please Mention Motor Age

Add to Garage Profits by Oxy - Acetylene Welding

Savings made please your patrons and pay good substantial profits.

PREST-O-LITE

Dissolved Acetylene
(Ready-made carbide gas)

adds to the efficiency and usefulness of any good welding equipment. We furnish thoroughly high grade welding apparatus for \$60.00. The average user will also need gas cylinders at an additional cost, and about \$10.00 worth of welding supplies. Truck and special equipment for cutting operations at extra cost.

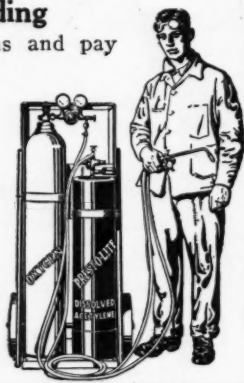
Send for details of Prest-O-Lite Service for Oxy-Acetylene Welding.

The Prest-O-Lite Co., Inc.

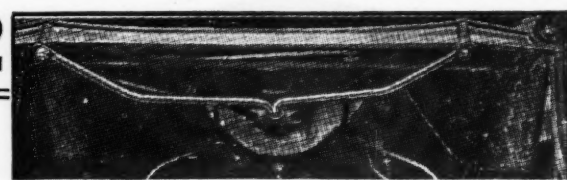
The World's Largest Makers of
Dissolved Acetylene

233 Speedway

Indianapolis, Ind.



\$2



\$2

Makes Your FORD Steer Easier

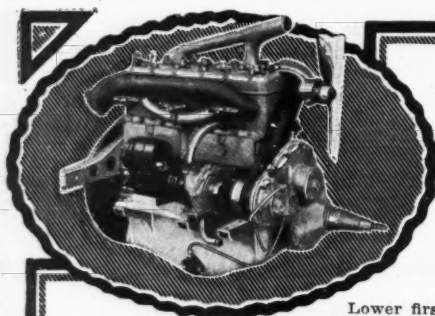
It's much easier to drive your Ford Car, and keep it in the road, with a—

CUSHION TRUSS ROD

Try One on Your Car—Money-Back Basis—It strengthens the radius rods, reduces wear on ball and socket, gives more mileage, makes car ride easier, acts as shock absorber. There's one for you. Get it on your car at once. Price \$2.00. Write for illustrated circular.

Dealers Wanted Everywhere

J. F. JOHNSON & CO., Quanah, Texas



Used in
America's
Best Light
Weight Cars

—because service
is built into

**THE
RUTEMBER
MOTOR**

Lower first cost and smaller up-keep make RUTEMBER the economy motor for all cars.

Model 20

3½x5
4-cylinder

The Rutember Motor Co.

Marion Indiana

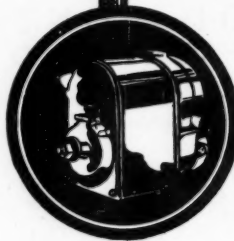
Chicago Office.....10 S. La Salle St.

EISEMANN

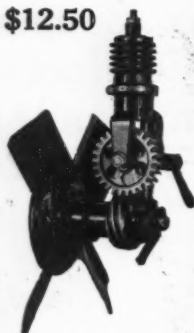
The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company
Sales and General Offices,
32-33d St., Brooklyn, N. Y.

New York, N. Y. Indianapolis, Ind. Detroit, Mich.
245 W 50th St. 415-417 N. Capitol Ave. 802 Woodward Ave



\$12.50



Oakes

Fan-Horn .. \$5.00
Fan-Pump .. 7.50
Kranklock... .75

all three in one assembly—interchangeable with fan on Ford in ten minutes. Simple and efficient. Pumps only when you want to inflate tires. Touch lever—that's all! Finest material—guaranteed.

Horn in Center of Fan

Oakes Beartone horn is motor driven, an integral part of cooling fan. Press button at driver's seat—that's all. Any volume or range needed—instant response, never fails. No gears, batteries, wires, or complicated mechanism. Oakes Fan is the best—outwears the car. Write for full particulars or dealer's proposition.

for FORD

THE OAKES COMPANY

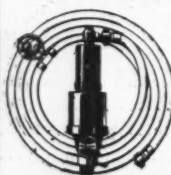
Indianapolis, Ind.

Hand Pumping Is Just Physical Torture!

But you will enjoy pumping tires with a

MAYO FREE PUMP

Simply substitute the pump for any convenient spark plug. The motor does the work—lets the motorist out.



Price, complete with 12 ft. hose and gauge, \$10. MAYO Q. D. Spark Plug, \$1.50 extra. Try one Free on your car for 30 days.

MAYO MFG. CO.

55 E. 18th St., Chicago



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CRITERION OF ITS CLASS

Thoroughbred Six—\$1875

Minute Man Four—\$1375

Six Supreme—\$2575

Equipped with Moore Multiple Exhaust System

Write for details and co-operative dealer proposition

The Lexington-Howard Co.

18th Street West

Connersville, Ind., U. S. A.

MARMON
"The Easiest Riding Car In The World"

"41"

\$3250

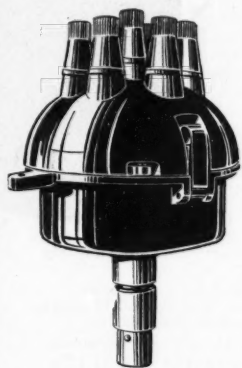
132" Wheelbase

"48"

\$5000

145" Wheelbase

Nordyke & Marmon Company
Indianapolis (Established 1851) Indiana
"Over Sixty Years of Successful Manufacturing"



The Atwater Kent Ignition System

Used by one-quarter of all
1915 U. S. A. built cars,
exclusive of Fords.

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PHILADELPHIA, PA.

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SPARK PLUGS

A greater sum of the essentials to unflinching service and complete satisfaction will be found in VIKING design and construction, than in any other plug at any price.

Buy VIKING PLUGS as
an insurance of service

Price \$1.00 each—all styles

THE JOHN MAC GREGOR COMPANY INC.
ROSLINDALE BOSTON, MASS.

Raybestos
TRADE MARK
REG. U. S. PAT. OFF.
THE PRODUCT OF BRAKE SPECIALISTS
USED FOR
BRAKE LINING - CLUTCH FACING
Manufactured by
THE ROYAL EQUIPMENT COMPANY
Bridgeport Conn.

MASTER Reg. U. S. Patent CARBURETERS

A MASTER PRODUCTION FOR TROUBLE REDUCTION

--Announcement--

Greater facilities for increased production have been made by the purchase of a new factory located at 1523-31 Fort St. West. General offices will now be located at above address.

Master Carbureter Corporation

1523-31 Fort St. West

Detroit, Mich.

Pacific Coast States—Master Carburetor Co., Inc., Los Angeles, Cal.

Dyneto
TRADE MARK
REGISTERED
SINGLE UNIT
Electric Starting
and Lighting System

Famous on the Franklin
Weights less than two-unit
systems. Naturally more efficient and less complicated than either one of two units

A Combination Motor Generator
Write for Particulars
DYNETO ELECTRIC CO., Syracuse, N.Y.
Send Us Your Electrical Problems



Link your motor to the BIG BOY—a big plug for big deeds. Guaranteed forever, because it's a—

Red Head
REG. U. S. PAT. OFF.
GUARANTEED FOREVER

BIG BOY.....\$1.00	Combination.....\$1.25
Regular......75	Platinum Point.....1.50
Priming.....1.25	All Sizes—All Dealers

EMIL GROSSMAN MFG. CO., Inc.
Bush Terminal
Model Factory No. 20, Brooklyn (New York City)
Chicago: 2615 Michigan Ave.

Twice the Light
With the Same Current

The NITRO-ARGON Headlight Bulb

ANY VOLTAGE FOR 6 TO 14. ANY CANDLE POWER
UP TO 32

Twice as white and intense a light of the ordinary tungsten bulb with the same consumption of current.

Price \$1.50 per pair

Send money order or check

Morelite Nitrogen Lamp Co., Longacre Bldg., N.Y.

Gasoline Can't Explode

You can build a fire under a McNutt can—you can hold a match in the opening of a McNutt can—It will never explode.

Hundreds of tests have been made by the New York and other Fire Departments, but no McNutt can has ever exploded.

Also—these cans prevent loss by evaporation and are so well made and reinforced that they will outlast 20 ordinary containers.

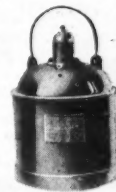
SEND FOR CATALOGUE—Our catalogue describes cans for every use and gives prices. Tear out the advertisement now to remind you to send for it.

DEALERS—These cans and devices sell on sight; remarkable opportunity; write for proposition.

JOHN C. EAMES, Inc.

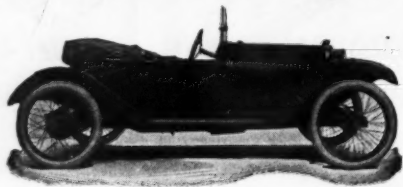
320 Broadway

New York



When Writing to Advertisers, Please Mention Motor Age

The Cornelian Light Car



\$410—Top and Windshield \$25 Extra

First car to qualify for the Indianapolis 500-mile race, breaking all world's records for cars of its class.

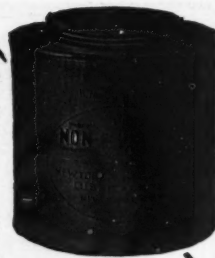
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Blood Bros. Machine Company, Allegan, Mich.

Makers of the famous Blood Bros. Universal Joints.

For Gears That Rattle, and Mesh
With a Grinding Crash Every
Time You Change Speed, USE

TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE



When you put a supply of this lubricant into your housing, you snuff out friction and you stifle noise. Your gears mesh in a soft, yielding cushion—metal never touches metal—each tooth is coated with a good-bodied lubricant, not merely wet with oil or filmed with grease. Try it.

"K. No. 00 Special" grade for sliding gear transmission.
"K. No. 000" for differential, compression cups and all bearings.
Reduced prices for 1915. Ask your dealer.

Look for the orange-colored cans with above trademark.

New York & New Jersey Lubricant Co.
165 Broadway, New York. 1430 Michigan Ave., Chicago, Ill.

SPARTON

Hand Horns
NEW PRICE

\$4.00

DELIVERIES NOW

ALL DEALERS

THE SPARKS-WITHINGTON CO., JACKSON, MICH.



DOUBLE ACTION
SHOCK ABSORBERS

HEAVY CAR TYPE

\$35.00 to \$45.00 per SET

FORD TYPE \$15.00 per SET

A. J. PICARD & CO.

1720-22 BROADWAY NEW YORK

WE NOW OFFER

The Searchlight Welder

A complete outfit for Oxy-Acetylene
Welding

at

\$50.00

High in Quality

Low in Price

Write for complete information to

THE SEARCHLIGHT COMPANY

1016 Karpen Bldg., Chicago, Ill.



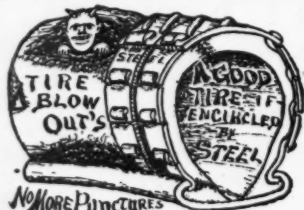
Make your pleasure car do your light hauling without injury to the car by using

THE SIMPLEX (Short-Turn) AUTOMOBILE TRAILER

Easily attached to any automobile. Light, durable. Trails in the track of the automobile. Will not upset. Costs about 10% of light delivery truck. Can be attached and detached quicker than hitching up a horse. Furnishes a great new field for the automobile dealer. Every pleasure car buyer that needs a light truck is a prospective customer. Write at once for liberal dealer proposition.

THE SIMPLEX SHORT-TURN GEAR CO.

Dept. G, Anderson, Ind.



Steel Protectors

Each section
2" wide 1/8"

thick. They hook to rim. As flexible as ever. Anti-skid, can't blow out or rim cut.

**HOW CAN THE RUBBER WEAR OFF
IF IT IS COVERED WITH STEEL?**

Try 2 or 3 sections over any old blowout

Special prices to the first in new territory

Kimball Tire Case Co. 173 Council Bluffs, Ia.



Tire covered
complete

HOLLEY

CARBURETOR

NO MOVING PARTS
ONLY ONE ADJUSTMENT

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PARTICULARS

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New York State
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**THAT GOOD GULF GASOLINE and
SUPREME AUTO OIL**

GULF REFINING COMPANY

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Cool, Delicious Luncheons

—kept fresh in this refrigerator basket
—can be packed, carried any distance
and enjoyed with a relish. The nickel-
plated, tin-lined ice compartment in a

Hawkeye

Refrigerator Basket

insures the hungry motorist, sailor
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lunch. Keeps both cold and clean.
Protected from dust, germs and in-
sects. Does not drip.
Write for folder M illustrating
basket in detail. (10)

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HAWKEYE BASKET COMPANY
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Tonneau
Basket
Rattan, fin-
ished deep for-
est green; lined
with non-rust-
able nickel-
plate. Brass or
nickel trim-
mings.



The New Waterproof -RAJAH- PLUG



Meets the Demand for an Absolutely Reliable
Waterproof (insulated) Plug

Furnished in all the standard sizes with Rajah
Regular Terminal fitting any cable. Rajah Ferrule
Terminals, making a neater connection, will be fur-
nished if a sample of cable is included with the
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Rajah Giant Plug... The { \$1.50 Postpaid
Rajah Standard Plug } "Old Reliables" { \$1.25 Postpaid

RAJAH AUTO SUPPLY CO., Bloomfield, N. J.

John Millen & Son Ltd., Montreal, Toronto, Vancouver, Winnipeg

When Purchasing a Car Insist Upon a

-LEECE-
ELECTRIC
STARTING-LIGHTING
SYSTEM
NEVILLE

100%
efficient

100%
efficient

THE LEECE-NEVILLE COMPANY
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TIRES and TUBES

are famous for their QUALITY

We wish to announce that irrespective of
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Braender Quality Will be Maintained

Braender Net Prices to Car Owners

Tires.	Plain.	Non- Skid.	Gray Tube.	Red Tube.
30x3	9.00	10.35	2.35	2.60
30x3 1/2	11.00	13.35	2.70	3.00
36x4 1/2	27.35	31.45	5.20	5.80
37x5	32.30	37.15	6.30	7.00

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Salisbury Wheel
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Hyatt Quiet Bear-
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For FORD CARS

Fully Guaranteed. Does the work. Cost—a fraction of electric starting cost. No harm to car; does not interfere with cranking in usual manner. Releases in case of backfire. Retards spark automatically before starting. Time tried success—no experiment. Be sure you get the BOSTON STARTER. Ask the Ford dealer or your dealer or write.



Boston Starter, Boston Mass.





BROWN Jr. Tire Pump

NEW PRICE, With Gauge and "T," \$5.50

Built like a motor with lapped rings. A high grade pump at a small price for medium size tires. You cannot afford to run your car without this pump.

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F. O. B. **\$1475** Factory

40 horsepower, 5 passenger touring and 2 passenger roadster, 118-inch wheel base, 34x4-inch tires (non-skid rears), spiral bevel gear rear axle, weighs 2,896 pounds ready for the road, Auto-Light starter, high tension ignition, complete equipment, 50 horsepower touring, roadster, sedan, limousine models—\$2,500 to \$3,800.

Moline Automobile Co., East Moline, Ill.

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COMPLETE THRUST BEARING

RADIAL RETAINERS

MADE IN AMERICA

Manufacturers of Star Radial Ball Retainers, Star Ball Thrust Retainers, Star Complete Ball Thrust Bearings

STROMBERG
CARBURETOR

"The Accepted Standard"

The New Stromberg Carburetors make records for Economy, Power, Acceleration and Smoothness of Running.

Write for Information

Send us make and model of your car and we'll tell you which new model Stromberg is best adapted for it.

STROMBERG MOTOR DEVICES CO., Chicago, Ill.

Write to-day for our Territorial Agreement on the

New \$1000

Inter-State "FOUR"

The one popular priced car with the greatest selling arguments in the country.

Inter-State Motor Co.
802 W. Willard St.
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THE UNIVERSAL CAR

Barring the unforeseen, each retail buyer of a new Ford car between August, 1914, and August, 1915, will receive from \$40 to \$60 as a share of the Ford Motor Company's profits.

Readily adaptable to all situations, the Ford is the car for your tours and camping expeditions, as well as being a general utility in the demands of everyday life, averaging about two cents per mile to operate and maintain.

Touring Car, \$490; Runabout, \$440; Town Car, \$690; Coupelet \$750; Sedan, \$975; f. o. b. Detroit with all equipment.

Ford Motor Company
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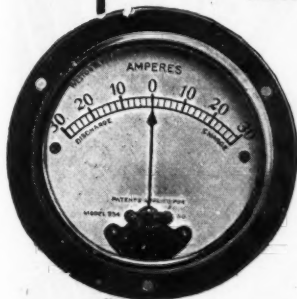


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What About Lights And Starting Motor?

How do you know when they will fail you?
Don't Take Chances!



Weston

**Model 354 AMMETER
On Your Dashboard or Cowl**

will keep you posted every minute regarding electrical conditions. It gives you warning of approaching trouble. Its exact information is invaluable—the cheapest and best insurance you can buy.

Write for full information.

Weston Electrical Instrument Co., 10 Weston Ave., Newark, N.J.
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**\$19.75
SET OF
FOUR
And Extra Rim**

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Ford Dealers are quick to see the big money to be made selling

PARKER HYDRAULIC Pressed Steel Wheels

They are lighter, stronger, and more easily demounted than demountable wooden wheels, and all for \$19.75 per Set of Four, with extra rim. Tires changed in two minutes. Write at once for attractive dealer's proposition.



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It's a pure gum cement—hence only a small quantity need be used to obtain satisfactory results.

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Makers of Goodyear Automobile Tires (2476)

WINTON SIX

That feeling of contentment which you enjoy in your beautiful home is multiplied by owning a beautiful car. And the same taste that demands a beautiful home demands a beautiful car also. The Winton Six is expressly made to satisfy that precise demand.

Two models, both sixes. The New-Size at \$2285, and the 48 H. P. at \$3250.

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112 inch wheel base. Electrically started and lighted.

Sphinx Motor Car Company, York, Pa.

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No tool needed to
seat or remove Valve

Interchangeable with All Stems

Fifty Cents Per Dozen
Single Valves, Five Cents

Double Seal Tire Valve Co.

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FREE!

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"Care and Repair of Tires"

It is a guide and text book that will post you thoroughly. It tells the proper inflation according to weight, load and season. It describes fully how to protect the tires while car is idle in the garage—how to care for them in winter—how to avoid substances that rot the rubber and fabric. It gives splendid hints on the spare tire and its care—how to carry extra tubes. It explains the tire sleeve, the blow-out patch—repair plasters and plugs and emergency or temporary repairs. This book is quoted as an authority by American and Foreign Automobile Publications, because of the authentic information it contains. It's free to any motorist. No obligations. Just write and we will send it to you without cost.

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PLAIN, "WM"
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TRADE MARK REGISTERED
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\$985 EIGHT \$985

"It leads the leaders"

THE LEWIS SPRING & AXLE CO.

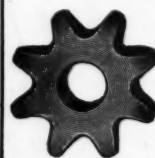
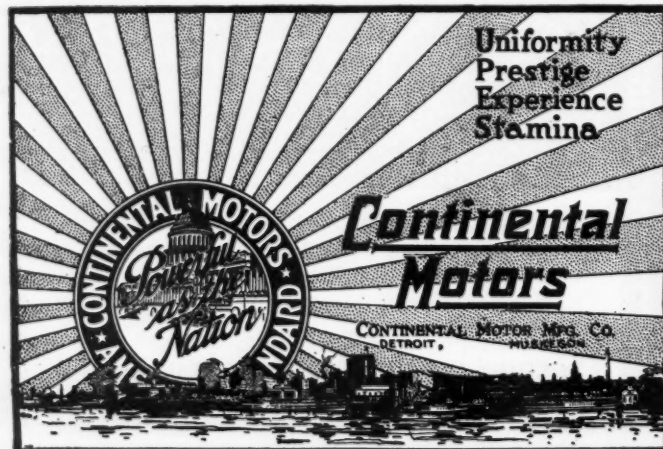
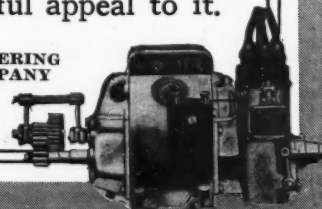
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Electric lighted and generator; recently re-painted; fully equipped. This is an elegant car for touring.
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Race car and equipment; one of cars to start in last Indianapolis Races.

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Automobiles, two five passenger and one seven passenger, newly painted and overhauled. Inquire of T. K. Hays, Bloomington, Ill.

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You can get from us good, serviceable machines of various makes for \$400 and up.

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Pierce-Arrow—8 cyl., 66 h. p., 7 pass.
Mechanically perfect. Very quiet. Tires, top, paint, upholstery, windshield, Warner instrument, excellent. Slip covers new. High class touring or livery car. \$1,000. Act quickly. **L. A. Prince, Battle Creek Sanitarium, Battle Creek, Mich.**

Pope Hartford Club Roadster
with Portola Motor
None better for speed and power. Address
FORT DODGE AUTO COMPANY
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1911 or 1912 Mercer Speedster, or Roadster
Any Condition.
Address Box E 356, c/o Motor Age, Chicago

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Address Box E 363, care Motor Age, Chicago

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Must be familiar with Knight type motor and general automobile construction, and be able to tell "how" and "why" in clear, convincing language. Give details of experience and send samples of work. State age and salary.

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\$50—The Admiral Welding Equipment—\$50
Outfits you for handling any job. Decarbonizing Torch. Instruction Book, and Supplies included. The Best at Any Price. Booklet Free.

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Selling, repairing and exchanging all makes of magnetos and coils. All types Bosch magnetos and type "A" coils bought in any condition. Agents for Marko Storage Battery.

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magnetos. We pay cash for them. Send full description.

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Get Our Prices

ALL WORK GUARANTEED

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EXPERT REPAIR WORK

On all makes of magnetos, coils, starters and generators—all work guaranteed. References, South Side State Bank of Chicago.

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We make guaranteed Platinum Screws and Breaker Arms for leading makes of magnetos.

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Official Service Station for

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Complete line of Electrical Accessories. Guaranteed Repair work ON ALL MAKES OF

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MAILING LISTS AND STATISTICS. Owners or dealers; any state, county, city; weekly and monthly supplements at lowest prices. Special lists of electricians, trucks, Fords, Studebaker, Overland, etc. **MOTOR LIST CO. OF AMERICA,** 1107 Locust St., Des Moines, Iowa.

WRITE FOR YOUR AUTO DIRECTORIES
and Addressing Requirements to

Auto List and Addressing Co.
1737 Broadway, New York City

MANUFACTURERS' OPPORTUNITIES

Manufacturers of Automobile Accessories
Patent applied—on folding auto trunk, stamped sheet steel, for sale on royalty basis.

The device to be secured to seat and safely hold robes, wearing apparel, etc., when car is left unattended, and so designed as to obstruct the steering wheel and thereby prevent the theft of the vehicle; takes up very small space when folded; nothing like it out.

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The Clearing House—continued.

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Sales Department, Pleasure Cars and Truck Manufacturers

I have travelled New England States 8 years, as traveling representative and salesman, getting dealers, closing contracts, following up dealers after getting them, assisting them on sales and helping them in every way possible to get business, give service and make profit.

Last two years have been travelling Middle West, and want to get back to New England. Now on vacation. Know the automobile, practically every detail, a salesman, a worker, alive

I AM OPEN FOR PROPOSITION NOW
Address Box E 349 c/o Motor Age, Chicago.

MR. MANUFACTURER

I want to get in the automobile accessory game and if you have an article of exceptional merit I will consider a co-operation to our mutual benefit. I have a store and will do the direct advertising to the North Side trade. Highest references. Correspondence to begin with.

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Gas, Oil and Steam Engine Hand Book
370 pages, illustrated, cloth, \$1.00. Send for complete list.

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Just off the press—512 pages covering all phases of the Motor Car. 470 pages on Electric Starting and Lighting. Send for sample pages.

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150 Igniting, Lighting and Starting Batteries, 6-60 to 6-150, all makes, \$5 to \$15.
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We announce a reduction of from \$20.00 to \$14.00 on our Spare Demountable Wheels for the Ford. We have some good territory left. Why not handle an original line? Carry extra wheel with tire on ready and interchangeable with any of present wheels. Can install outfit at home, then change wheels in less than two minutes. Write for catalogue. Legitimate dealers, get our agency for Spare Wheels, Spring Radius Rods, Fan Belts, Radiators, Cradles, etc.
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Supplied promptly, any "orphan" car. Send us broken parts for quick duplication; service the best and prices right.

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All Parts in Stock at Discount

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Statite Rings, \$1.00 each.
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Schebler equipment. Why not get a Schebler Model R for your car? Our exchange proposition makes it easy.

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Exclusive Sales Representatives for Manufacturers who supplied Motors, Axles, Wheels, Transmissions, Steering Columns, Control Levers, etc., etc., to the

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Write for prices on parts needed in connection with American cars.

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We are the sole owners, manufacturers and distributors of repair parts for ALL MODELS AMERICAN UNDERSLUNG CARS.

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AMPVO 6-volt, 60-amp. Batteries, \$6.75 Each
Limited sale, absolutely new and guaranteed.
Elba 6-150, \$12, Vesta 6-120, \$10, 6-80, \$7.50
Our factory prices are genuine bargains.
THE AMPVO BATTERY CO.
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A STREAM-LINE HOOD

For 1915 Fords
Write for illustrated circular
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A Top Exposed to the Sun Needs Oil

Leather, rubber and pantosote tops should frequently be coated with Peerless Leather Top Dressing, which is purely an oil preparation that keeps them soft and pliable, and looking like new. Ask anyone selling automobile supplies.

THE COLUMBUS VARNISH CO.
Makers Columbus, Ohio

At Your Service

We can furnish any parts, either supplies or repairs. A partial list:

Auto creepers steel casters.....	\$ 0.80
40 H. P. Presto tank and tanks.....	12.00
New 2½ solid tire wheels for Krit or Ford cars, set.....	40.00
New rear axle N. D. bearings 3½-1 ratio	55.00
34x4 wheels 12-1½" spokes, Q. D. rims, set.....	12.00
34x4 Baker demountable 12-1½" spokes, set.....	22.00
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New 40 H. P. motor, clutch, magneto and coil.....	165.00
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Krit 1913 Oval cap.....	15.00
Jackson, honeycomb.....	15.00
Oldsmobile.....	22.50
Midland fenders, 10" wide, set of 4.....	10.00
Jackson black enameled fenders, 8" wide, set.....	9.00
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Mole skin racing seats.....	18.00
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Built, Recovered and Repaired
C. G. MEYER & SON Tiffin, O.

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for the following cars:
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D. R. 4 Bosch Mag.....\$27.50
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We maintain a complete stock of parts for the above cars.

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EMF 30 Pierce
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And many other makes—also Magnetos, Carburetors, Axles and Wheels

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Buick 10, E. M. F., Flanders, Winton, Overland, and Regal 30. Parts a Specialty
Motor parts and accessories for almost any make of car

Write Us Your Needs

AUTO SEAT COVERS

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For all makes of cars. Sit right down and write for our samples and price list.

Best Materials. High Class Workmanship
We maintain a separate department for repairs

WESTERN AUTO TOP CO.

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AUTO TOPS AND RACING SEATS

Mohair tops for runabouts, \$20.00; Mohair Tops for touring cars, \$30.00. Racing Seats, per pair, \$18.00. **AMERICAN AUTO TOP MFG. CO.,**
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Auto Tops, Bodies and Seat Covers

Hand made. We make a specialty of one man tops with Jiffy curtains. Write for prices.

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BALL BEARINGS REGROUND

One Firm One Service
One Guarantee

Back of Every Bearing Ground by

Ahlberg Bearing Company

2636 Michigan Avenue
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New York Cleveland
Boston Detroit
St. Louis Los Angeles

The Clearing House—continued.

Advertisement for Bids for Furnishing Motor Vehicle Tags for 1916 Registration. No. Dakota

Notice is hereby given that proposals for furnishing to the State of North Dakota thirty thousand (30,000) automobile tags with duplicates and twenty-five hundred (2500) motorcycle tags with duplicates—with such additional tags and duplicates as may be required during the year 1916—will be received at the office of Thomas Hall, Secretary of State, at the Capitol, in the City of Bismarck, North Dakota, until two o'clock, p. m. on the 20th day of July, 1915.

Tags must conform in size and form with the provisions of Sec. 2976j, Compiled Laws of 1913.

Each automobile tag shall be furnished with a 3/16-inch round hole at each corner and also slots near the margin of the plate top and bottom, just inside of each corner hole, or four holes and four slots to each plate. It is preferred that these slots are to be so constructed or protected to prevent cutting or injuring the hanger straps. Tags must be rounded at the corners. The tags shall be made of 28 gauge, Bessemer steel with the numerals and letters to be embossed or depressed (preferably depressed), but so constructed as to render the apparent size of plate or tag as small as possible but still giving numerals, letters and plate of the sizes required by law. The tags must be so crimped or designed as to provide sufficient rigidity and durability.

Tag color to be black with canary yellow numerals and letters. Full dipped enamel.

Tags are to be packed in heavy manila envelopes ready for mailing. Two plates of the same number are to be in each envelope with proper packing, to prevent damage in shipment to final destination, and also to be packed as lightly as is consistent with safety in order to save postage.

The envelope is to bear the following printed

return card: "From Thomas Hall, Secretary of State, Bismarck, North Dakota," and "Postmaster: If not delivered in five days notify this department for return postage, giving the number of the tags as indicated below," the former in the upper left hand corner in large type and the latter at right angles thereto across the left end, and in ten point type. The envelopes are to be printed or stamped with the same number that tags enclosed in said envelope bear. The tags so enclosed, as above to be delivered packed in substantial crates, each crate to contain 50 sets of tags consecutively numbered and properly packed in numerical order. On the packing sheet used between the tags in each envelope there shall be printed instructions to owners, the copy for which is to be supplied by the Secretary of State.

Tags shall be delivered F. O. B. Capitol Building, at Bismarck as follows:

Five thousand (5000) automobile and five hundred (500) motorcycle tags, not later than December 10th, 1915.

Twelve thousand (12,000) automobile and five hundred (500) motorcycle tags in addition to previous delivery, not later than January 10th, 1916.

Ten thousand (10,000) automobile and five hundred (500) motorcycle tags, in addition to previous deliveries, not later than February 10th, 1916.

Balance of tags to be delivered not later than March 10th, 1916.

Payment of tags to be made as follows:

For first shipment on February 1st, 1916; for second shipment on March 10th, 1916; for third shipment on April 20th, 1916, and the balance to be paid on or before July 1st, 1916. Pay-

ment in all cases may be anticipated by the Secretary of State.

All tags ordered by the Secretary of State except those for which a definite date of delivery is herein specified, shall be delivered at such time and in such quantities as the Secretary of State may direct.

The right to purchase tags in the open market is hereby specifically reserved. Such right may be exercised in event of failure upon the part of the contractor to furnish the necessary number of tags as and when ordered, the difference in cost of such tags and necessary expense incident to securing them, to be charged to the contractor, and such amount may be deducted from any amount then due the said contractor or recovered under his bond.

All tags must be finished in a thorough and workmanlike manner and the right is reserved to reject any tags for defective material or workmanship. The contractor must agree to refinish or replace without expense any tags that fail under ordinary usage during the term of the contract.

Bidders are required to furnish samples of work and to specify in detail the metal and coats of enamel to be used.

Each bidder is requested to name price per pair for tags specified and also price per pair for additional tags and duplicate tags.

Each bid must be accompanied by a certified check in the sum of \$100 made payable to Thomas Hall, Secretary of State, as a guarantee that the bidder will carry out the terms and conditions of the contract.

The right to reject any and all bids is hereby reserved. All bids must be sealed and marked, "Bid for furnishing motor vehicle tags," and addressed to

THOMAS HALL, Secretary of State, Bismarck, North Dakota

AUTO TOPS—SEAT COVERS

General upholstery. Racing seats. All kinds of Auto Sheet Metal Work. Write for prices.

CHICAGO AUTO EQUIPMENT CO.

808-10 W. Jackson Blvd. Chicago, Ill.

Body Bargains

New stream line flush side Cowl dash bodies, trimmed in genuine leather, deep, soft upholstery, extra thick cushions, painted and varnished, ready to set on your chassis.

New Cadillac models.....	\$75
New Studebaker models.....	75
New Buick models.....	75
New Empire models.....	75
New Ford roadster, 1915 model..	35
New Ford Touring, 1915 model..	55
New Elmore models.....	50
New Abbott-Detroit models.....	45

And many others too numerous to mention. Write and tell us the measurements of your frame. We can fit any car with a new body.

SEND FOR PRICE WRECKER
ON AUTOMOBILE SUPPLIES

Times Square Auto Co.

1210 MICHIGAN AVENUE, CHICAGO
Also 56th Street and Broadway, New York

Bucket Seats

RACING BODIES

AUTO REMODELING CO.

1508 Michigan Avenue Chicago, Ill.

BARGAINS

8-Cyl. motors, brand new, \$3 abd 51 H. P. A. L. A. M., \$400; resp., \$600. Selective transmission, 3 speeds forward and reverse, \$25. Timken rear axle, complete, \$25. Front axle, \$5. Steering gear, \$10. touring body, top side curtains, wind shield, \$15. Runabout body, tire holders in rear, \$15.

Adams 2.753 Ave. D, Brooklyn, N. Y.

Don't Buy Krit or Car-Nation Parts Before Getting Our Prices

Car-Nation rear axle (shaft drive), new...	\$25.00
Car-Nation front axle, new, with hubs and bearings	10.00
30x3" wire wheels to fit the above axles, per pair	10.00
Car-Nation Barnes steering gears.....	10.00
Car-Nation 4-passenger bodies, finished, not trimmed	10.00
Car-Nation hood sides.....	.75
Car-Nation rear dust shields.....	.50
Krit divided seats, unupholstered, not painted, each.....	3.00
Krit radiators	15.00
Krit mufflers	1.50
Krit brake and clutch pedal assemblies...	2.00
30x3 1/2" regular clincher wheels for Ford car, each	2.00
30x3" regular clincher wheels for Ford....	1.50
Battle Creek dashes, 23 1/2"x36 1/2".....	1.00

Get Our Quotations on 34x4 1/2" and 36x4 1/2" Wire Wheels

U. S. AUTO SUPPLY CO.

859 Woodward Ave.
DETROIT, MICH.

Cocoa and Carpet Mats, Hand Made Seat Covers, Auto Tops Built and Repaired
AUTO CAFE TOP CO.

2334 Michigan Ave. Chicago, Ill.

"Caille"

PORTABLE MOTORS BOAT

List Price, Complete, \$80.00 Each

Special Sale Price, \$39.50

We have just purchased a very large quantity of these very high-grade boat motors which are NEW 1914 Models, and guaranteed by the Caille Perfection Motor Co., of Detroit, Mich., whose reputation has long been established. These motors are last year's surplus stock.

TO ATTACH, turn two thumb screws. Used on any round or flat-bottom, square or pointed stern rowboat, at any angle or depth of stern. Weight of motor 50 lbs. Speed regulated as desired—maximum 8 to 9 m. p. h. Minimum water depth required 9 to 10 inches. Steering by propeller as well as rudder. Exhaust is under water, causing absolute quiet. Cylinder bore 2 1/2"x2 1/2" stroke. Ignition—Coil and Timer. Gas tank holds fuel for 5 hrs. run. Propeller blade 9 1/2" diam. with guard fin. at bottom. Positive lubrication. Carburetor is simple automatic and spill-proof. TERMS:—Cash with order, or C. O. D., on receipt of deposit.

ORDER TODAY!

SEND FOR PRICE WRECKER
ON AUTOMOBILE SUPPLIES

Times Square Auto Co.

1210 Michigan Avenue Chicago
56th and Broadway New York

CUT PRICES

Send for our illustrated cut price auto supply catalogue.

Liberty Tire & Supply Co.

98 Chambers St. New York, N. Y.

The Clearing House—continued.

Can't Rust Your Rims, or Make Your Tires Stick

when one coat of Peerless Anti-Rust Rim Paint has been applied. Dries in four to five hours, and will always allow the tires to be removed with ease. Ask anyone selling automobile supplies.

THE COLUMBUS VARNISH CO.
Makers Columbus, Ohio

DEALERS:

Ford gasoline gauge. Accurate, registers in gallons. Always in view. Price \$1.00. Sample sent any place in U. S. if you send 60 cents.

HENES SALES CORPORATION
443 Barry Ave. Chicago, Ill.

FORD OWNERS

Send at once for our 1915 Cut Price Ford Specialty Catalogue.

HARRY M. SMITH
253-255 Madison St. Passaic, N. J.

Demountable Wire Wheels

For Fords, Car-Nation, and Hupp 20, only \$12 for 5. Gas and electric head lamps for Fords and similar sizes, only \$3.25 pair. Stylish side electric bullet lamps, \$3.00 a pair. Electric tail lamps, \$1.00.

1/3 Deposit with C. O. D. Orders.

BENEDICT

63 Winder St. Detroit, Mich.

Don't Waste Your Money

\$650

Will Buy a New \$1,475.00 Marathon Touring Car

These are large, roomy, powerful cars, the kind you would expect to get for \$1,475.

They must be sold at once, and our necessity is your opportunity.

SEE THESE CARS TODAY!

Our bargain surprise for the season is our

New Twombly Roadster

with R cylinder engine, 15 horse power, water cooled, three speeds forward, one reverse, two-passenger, stream line body, high tension magneto, Schebler carburetor and the most perfect and complete little roadster in the world. The original price was \$475.

We offer them while they last for

\$195

Send for Price Wrecker on Automobile Supplies

TIMES SQUARE AUTO CO.

1210-1212 So. Michigan Avenue, Chicago
Also 56th Street and Broadway, New York

EUREKA DIAMOND HONEYCOMB RADIATORS

For Ford Cars—absolute satisfaction guaranteed—the BEST that money and brains can produce—V type in polished brass, \$35.00; nickel, \$40.00. Flat face in polished brass, \$25.00; nickel, \$30.00.

EUREKA AUTO PARTS MFG. CO.

1918 Pine St. St. Louis, Mo.

F. & H. WIRE WHEELS

Equipped with F. & H. Special Wire Wheel Rims. Adaptable to any car. Complete equipment for Ford cars.

THE F. & H. WIRE WHEEL CO.
Springfield, O.

FORD CAR BODIES

Commercial bodies guaranteed to fit Model "T" Ford. Bucket seats not painted or trimmed, \$5.00 per pair. Trimmed and upholstered backs and cushions, \$15.00 per pair. We also build a full line of Speedster bodies complete; also Ambulance and Undertakers' cars, all for Ford chassis. Send for our catalog. Agents wanted everywhere.

COLUMBIA BODY CO. OF DETROIT

21-23 Selden Ave. Detroit, Mich.

FORD PILOT STEERING DEVICE

Tried and NOT found wanting. Will keep the car in the road, prevents accidents or turning too short and will save its cost three times yearly in tire wear alone. Spring has but one inch travel and will last life of car. Nothing to get our of order. Write for terms to agents and accessory dealers.

AUTO EQUIPMENT MFG. CO.

110 Independence Ave., Kansas City, Mo.

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New 1915 cowl dash Ford Touring and Roadster Bodies at prices that appeal. Get our prices before buying. **LONDON AUTO SUPPLY CO.**, 2548 Wabash Ave., Chicago.

Ford Specials

Ford Touring Tops complete.....\$18.50
Ford Roadster Tops complete..... 15.00
Ford 1-Man Top with Jiffy curtains..... 25.00
Ford Cowl Shield 12.00
Ford Dem. Wheel sets..... 15.95
Speedometer, Stewart & Warner, \$40 style. 8.50
Elec. Torpedo B&N Head lamps, 12" size, \$5 pr. Tool Boxes, all sizes.....\$1.45 ea.
Auto creepers, large size......95c ea.
Gasoline Tanks, all sizes.....\$4.50 up
Bumpers, all styles\$2.50 up

THOUSANDS OF OTHER BARGAINS

SEND FOR OUR NO. 10 PRICE WRECKER

TIMES SQUARE AUTO CO.

1210 Michigan Ave., CHICAGO, ILL.
Also 56th & Broadway, NEW YORK

FORE DOORS

Made for all old cars without the doors. We have all patterns. Just give us the name of your car. **CHICAGO AUTO BODY CO.**, 1627 Michigan Ave., Chicago, Ill.

FOR SALE

Eight cylinder DeDion Bouton motor, as good as new. This is a remarkably fine job—an exceptional buy at \$750. Quick action necessary. Address **THOMAS B. JEFFERY COMPANY**, Kenosha, Wis.

FOR SALE

Four Johnson computing fare boxes. Boxes cost \$100 each; now in good order; make us an offer.

Box 126, Huntington, Ind.

FOR SALE—Thomas 6-70 Radiator, like new, \$25.00. Bargain. **J. F. Charley Auto Co.**, Evansville, Indiana.

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Transmission and differential gear, drive gears and pinions; also axle shafts in stock for over one hundred makes of cars. Largest assortment of gears in the United States. All parts new.

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Chicago, Ill. New York, N. Y.

GOGGLES NEW ERA are the best. Dealers and Garages, send for our 1915 catalogue—a big line of real money makers.

NEW ERA OPTICAL CO.

The Advertising Building Chicago

"Grab a Body" Chance!

Have 350 New and Used Bodies All Makes and All "Up-to-Style" Must unload and most will be sold for 10% OF VALUE

ALSO

Limousines, Coupes, Landaulets, Sedan Bodies

Buy now and save 40% to 60%—A deposit will hold till wanted. Some as low as \$50, \$75, \$100.

JANDORF AUTOMOBILE CO.

"Our Prices Scare Our Competitors" Automobile and Body Department

1767 Broadway, near 57th St., New York

Is Your Car Listed Here ?

Krit
Speedwell
Omaha
Carhartt
Henderson
Clark-Carter
California
Dart
Barnes
Anhut
Elmore
Aerocar
Everett
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Marquette
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De Luxe
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Welch Detroit
De Mot
Queen
Cutting
Grabowsky
Michigan
F. A. I. Car
Reliable
Dayton
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Northern
Abbott
Ohio
Crescent

If not, drop us a line stating your requirements on repair parts. We are prepared to offer scientific, efficient and prompt service on all cars enumerated as well as all other makes. We are located in Detroit, the heart and center of the automobile industry, and buy our stocks in carload and trainload lots—Spot Cash buying and selling—You Benefit—Prices far below those of manufacturers.

All Service Parts All Cars

We are the original and pioneer accessory and parts distributors. Largest and most efficient Service Department in the World. Our deliveries are prompt. Write us now your wants.

PURITAN MACHINE CO.

A. O. DUNK, Pres.

410 Lafayette Boulevard, Detroit, U. S. A.

ALL PARTS FOR ALL CARS

K R I T OWNERS

Do not be misled. The Krit Motor Car Co. will be continued and there will never be a time when you cannot procure from us immediate and accurate shipment on all repair parts orders.

We guarantee absolute accuracy of every part we ship and handle all orders within 24 hours after received in this office. Address all mail same as always to the K R I T MOTOR CAR CO., DETROIT, MICHIGAN.

K R I T MOTOR CAR CO.

Detroit, Mich.

The Clearing House—continued.

LOOK

A few selections that should interest every Auto Owner and Garage

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6-Cyl. Eiseman with coil high-tension.....	\$32.00
4-Cyl. Splittorf Model X.....	10.00
4-Cyl. Remy R, D and S.....	10.00
4-Cyl. Briggs.....	10.00
4-Cyl. Michigan.....	10.00
4-Cyl. Remy R L coils.....	6.00
4-Cyl. Splittorf coils.....	6.00
4-Cyl. Eiseman high-tension.....	20.00

CARBURETORS

Model L Schebler 1 1/4".....	\$ 5.00
Model B-4 Stromberg 1/4".....	8.00
1 1/4" Marvel carburetors.....	3.00
1 1/4" air friction carburetors.....	3.00
1" Holley top intake.....	3.00
1 1/4" and 1 1/2" Kingston.....	2.00
Model E Prest-O-Lite tanks.....	8.00
Model B Prest-O-Lite tanks.....	10.00

RADIATORS

Oakland 42 "V" shape.....	25.00
Ford honeycomb straight front.....	18.00
Ford "V" shape honeycomb.....	23.00
Chalmers 30 (used).....	10.00
Buicks, all models—get prices	
Hupp 20.....	25.00

WHEELS

30x3 1/2 Ford rear.....	\$ 2.00
30x3 Ford front.....	1.50
30x3 1/2 regular Maxwell wheels.....	1.00
34x4 and 4 1/2 Q. D. wheels.....	2.00
Ford and Maxwell demountable wheels, set of 4 and extra rim—any finish.....	14.00
Great bargains in Ford touring car tops; also roadster type. Spark plugs, all sizes. Lamps. 1 1/4" radiator hose. Wooden running boards. Foot rails. Drag links, 75c each. Front axles with hubs, \$12.00. Stewart speedometer cables, \$2.00. 60-mile Stewart speedometer heads, \$3.00.	
Ford Crown fenders, set of four.....	\$12.00

Send for Bulletins—they are free

Automobile Specialty Co.

999 Woodward Ave.
DETROIT, MICHIGAN

Lozier Repair Parts

We have on hand repair parts for Lozier Cars at reduced prices. Send old parts for replacement. Philadelphia Machine Works
67-71 Laurel St., Philadelphia

MAXWELL OWNERS AND REPAIRMEN

Why pay 20% advance for your repair parts for the old models of MAXWELL cars? We can supply 90% of your wants at the old list price. Transmission gears and parts in stock for Cadillac, Case, Croxton, Dorris, Elmore, Moline, Moyer, Overland, Regal, Selden, Stoddard, Velle and 75 others at cut prices. Why pay more? Send for price list.

M. P. SUPPLY COMPANY
Atlanta, Georgia

Make Your Mohair Top Last Another Season

Peerless Mohair Top Dressing will waterproof and renew the finish of an old mohair top, making it look like new. Ask anyone selling automobile supplies.
THE COLUMBUS VARNISH CO.
Makers Columbus, Ohio

MAXWELL

General line of repair parts for all old models MAXWELL cars at the old list price. All parts are new.

AUTO GEAR & PARTS CO.

1461 S. Michigan Ave. Chicago, Ill. 1777 Broadway New York, N. Y.

MICHIGAN OWNERS

We have in stock all repair parts for every Michigan model and ship orders for repair parts within 24 hours after order is received in our office. We guarantee absolutely accuracy of every part. Prices same as charged by old Michigan Motor Car Company.

MICHIGAN MOTOR CAR PARTS CO.

Successors to
Michigan Motor Car Co. of Kalamazoo
DETROIT, MICHIGAN

Motor Bargains

25 H. P. Unit Power Plants.....	\$140.00
Engines only.....	100.00
30 H. P. Unit Power Plants.....	170.00
Engines only.....	125.00
35 H. P. Unit Power Plants.....	185.00
Engines only.....	140.00
40 H. P. Unit Power Plants.....	200.00
Engines only.....	155.00
55 H. P. Engines only.....	\$250.00

All Four Cylinder Four Cycle

Bargains for Quick Sale

Pittsburgh Model Engine Co.
Pittsburgh, Pa., and Peru, Ind.

MOTORS

Franklin, 4 cyl., 4 x 4 1/2.....	\$ 40.00
Elmore, 4 cyl., 2 cycle.....	50.00
Empire, 20 H. P., 4 cyl., 3 1/2 x 3 3/4.....	75.00
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Continental, 30 H. P.....	75.00
Oswald, 4 cyl., 4 x 4 1/2.....	75.00
Moon, Model C, 4 1/2 x 5 1/4.....	75.00
Stoddard Dayton, 8-K, 4 3/4 x 5 1/4.....	75.00
Regal 30, 4 x 4 1/2.....	75.00
Bergdoll, unit power plant, 3 3/4 x 4 1/2.....	150.00
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Herschill-Spillman	4-cyl.	40 H. P.	175
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Brownell	6-cyl.	35 H. P.	225
Unit Power Plant			275
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From \$6 to \$15 per Cylinder

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Size	Plain	Non-Skid	Tube
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32x3½.....	7.50	2.25	35x4½.....	12.50	4.10
34x3½.....	8.00	2.35	36x4½.....	13.50	4.15
30x4.....	8.50	2.85	37x4½.....	14.00	4.25
31x4.....	8.75	2.95	36x5.....	15.00	4.95
32x4.....	8.50	3.05	37x5.....	16.00	5.05
33x4.....	9.00	3.10			

Non-Skids \$1.00 Extra; All Sizes

EXPRESS CHARGES PREPAID

only when money accompanies order in
full.

10% required on C. O. D. orders.

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Authorized Capital, \$300,000.00

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In Guaranteed and Used Tires

Size	Used	New	Size	Used	New
30x3	\$4.50	\$ 6.00	34x4	\$ 9.00	\$12.00
30x3½	6.00	7.80	34x4½	10.00	17.00
32x3½	7.00	8.75	36x4½	11.00	17.90
33x4	9.00	11.85	37x5	12.00	21.00

10% deposit with order, balance C. O. D. subject
to examination.

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The Clearing House—continued.

Tires Tires Auto Owners

Watch for my coming announcement on my STITCHED and STITCHLESS TIRES. The prices on these tires, considering quality, will give the consumer bigger and better value on every dollar spent.

I have just bought the plant of the

Century Tire & Rubber Co.,
of
Plainfield, New Jersey

where I propose building a special grade of Stitchless tires. By this new process I eliminate all stitching, using nothing but the best grade of rubber and fabric and at the same time giving you a sound tire at a nominal cost. I am also manufacturing a new tire carrying a 3500-mile guarantee. Selling price about 40% off regular list. Don't buy your tires before seeing my big announcement, to appear shortly in The Automobile. Watch for this; it will save you money. Write for full particulars if interested.

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Dollars Lower—Miles Cheaper
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Premier Red Tires guaranteed 4,000 miles, 25 to 35% off! Send for price list.
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Made from two old tires. Price \$2.00 to \$4.00. Guaranteed 2500 miles. Send for "Tico" booklet.
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We are the largest second hand tire dealers in the West. Our tires are guaranteed to be in good serviceable condition. These tires are all standard makes. Clincher, straight side, or Q. D. clincher:

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31x3 1/2 ... 3.50	35x4 ... 6.75	35x5 ... 8.00
30x3 1/2 ... 3.50	33x4 ... 6.50	36x4 1/2 ... 7.50
30x4 ... 5.00	34x4 1/2 ... 7.50	37x4 1/2 ... 8.50
32x3 1/2 ... 4.50	36x3 1/2 ... 7.00	36x5 ... 8.50
31x4 ... 4.50	34x4 ... 7.00	37x5 ... 8.50

We are also equipped with one of the largest and most complete vulcanizing plants in the city, where we can give you good and immediate service. All repair work guaranteed. Out of town trade solicited. All goods sent C. O. D., subject to examination, on receipt of 10 per cent of order.

We positively guarantee our repair work.

AUTO SALES AND PARTS
1427 S. State St. Chicago

TIRES TIRES

All Fresh Selected Seconds

Case	Tube	Case	Tube
30x3 ...\$ 6.00	\$1.85	34x4 ...\$12.90	\$3.00
30x3 1/2 ... 7.90	2.05	35x4 1/2 ... 17.90	3.80
32x3 1/2 ... 8.85	2.25	36x4 1/2 ... 18.25	3.70
33x4 ... 12.00	2.90	37x5 ... 21.00	4.50

All other sizes in stock. Non-skid 10% extra.
All orders C. O. D. on approval
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Full guarantee on all inner tubes

WE CUT YOUR TIRE BILLS

DOUBLE TREAD YOUR TIRES
Send us two old tires and we return them built into one 90% puncture proof tire good for thousands of miles of hard service.

30x3\$2.75	34x4\$4.25
30x3 1/2 3.00	36x4 4.50
33x4 4.00	36x4 1/2 4.75

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Our prices are the lowest consistent with high class workmanship
All Work Guaranteed

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Expert welders on automobile parts. Manufacturer of the Galbraith Welding Torches.

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Cracked Cylinders a Specialty

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\$25.00 to \$250.00

Liberal terms to responsible persons or firms. Write

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are received by MOTOR AGE from its readers asking where they can obtain certain Motor Car Parts and Accessories.

Were those products advertised in MOTOR AGE it would mean quick sales for Manufacturers, Dealers or Distributors.

Over 23,000 Motorists receive this Journal each week and they all need Parts and Accessories—especially now.

There are many Dealers, Jobbers and Distributors who have products of the Automobile Industry that can be advertised to advantage right here in these CLEARING HOUSE columns. Many of our largest institutions started with a very small investment and you will find concerns using large space in MOTOR AGE now that began with only a one-half inch ad in these columns.

If you have Motor Car Parts or an Accessory and haven't time to prepare an advertisement, we will do it for you—no charge.

Address your letter to

Dept. C. H., Motor Age, Chicago

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& Engineering Company**
3328 Ludlow Street, Philadelphia, Pa.

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N. A. PETRY CO., Inc., 1309 Race St., Philadelphia, Agents for Penna. and Atlantic Coast States, South.

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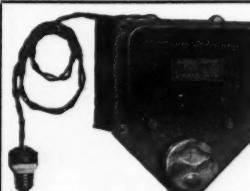


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Motor and generator combined in one compact, self-contained unit, although acting independent of one another. 12-volt, 3-wire system, 6-volt lamps. Noiseless. Attached without machine work. Write.

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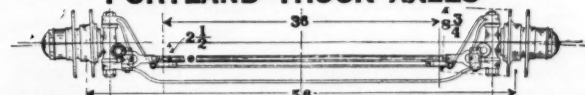


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Sizes suitable
for Garages
and Individuals
Write for catalog.

ST. LOUIS ELECTRICAL WORKS Arlington & Easton Aves. ST. LOUIS, MO.

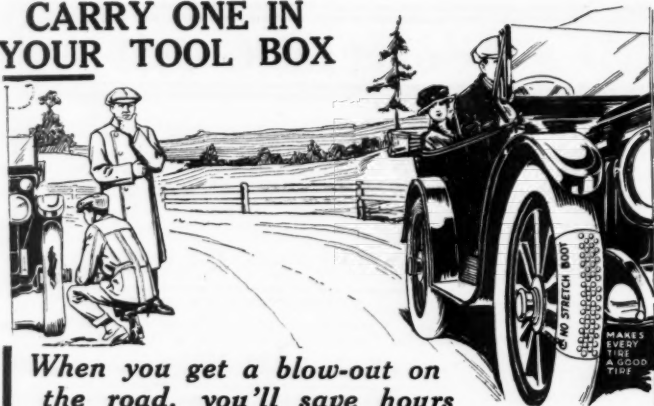
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Front I Beam Axle, suitable for One-ton Trucks, I Beam Type, \$20.00
Solid Tire Wheels, complete with tireseach 10.00
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2 Cyl. 20 H. P. Motors, new... 75.00
Pressed Steel Frames..... 5.00
Full Elliptic Springs.....each 2.00
Other Parts Just as Cheap

AUTO PARTS COMPANY, 737 W. Jackson Blvd., Chicago, Ill.

CARRY ONE IN YOUR TOOL BOX



When you get a blow-out on
the road, you'll save hours
and cash if your equipment includes a
K-C No Stretch Boot

The only Boot that combines the wearing
strength of steel-studded leather and the
water-resisting qualities of a Rubber
Boot—Two Boots in One—can't stretch.
Adjustable Hooks to fit every varia-
tion in new and old tire sizes. Hugs
the tire snugly. Keeps out water
and sand. Hooks on in a minute.
Outwears the tire.

Ask any Auto Supply Store or
Garage for the K-C tire access-
ories. Write for complete
catalog



Holds
a 4-inch
Blowout!
Guaranteed
2000 Miles!

**Western Tire
& Rubber Co.**

"America's Larg-
est Tire Acces-
sory Makers"

Kansas City, Mo.



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Republic Motor Trucks

*The Fastest Selling Line of Motor
Trucks in America*

3/4-ton with express body, in-
ternal gear drive.....\$ 995.00
1 1/2-ton chassis, internal gear
drive 1575.00
1-ton chassis, chain drive..... 1350.00
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The Vitals of the Republic

1 and 1 1/2-TON MODELS (Chain Drive)

Continental Motor	Russel Full Floating
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Bosch Magneto	Covert Transmission
Stromberg Carburetor	Standard Cone Clutch
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No Better Units Built

We ask the opportunity to prove our statements.
Wire or write for catalog and complete information.

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DOVER

Reg. U.S. Pat. Off.

SPECIALTIES

Every Owner and Garage Needs Them

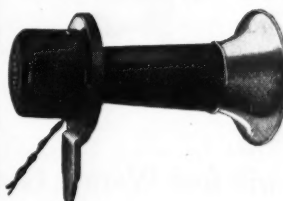
DOVER is the last word the world over in any of the 235 various articles we make for Automobile use, few of which are shown here. The very best of material and workmanship obtainable, is used, a great deal of attention paid to finish and a thorough test and inspection given every article before it leaves our factory.

DOVER STAMPING & MFG. CO.
CAMBRIDGE, MASS., U. S. A.



AUTOMOBILE

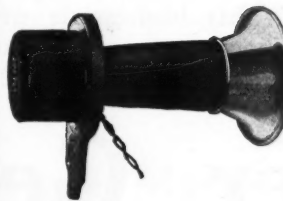
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\$2.75

Electric Vibrator

Same horn—under hood.....\$2.50



\$5.00

Electric Motor

Same horn—under hood.....\$4.75

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CLEVELAND

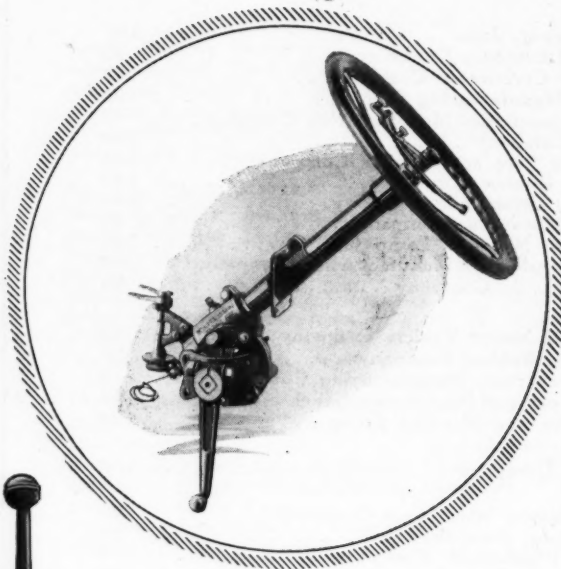
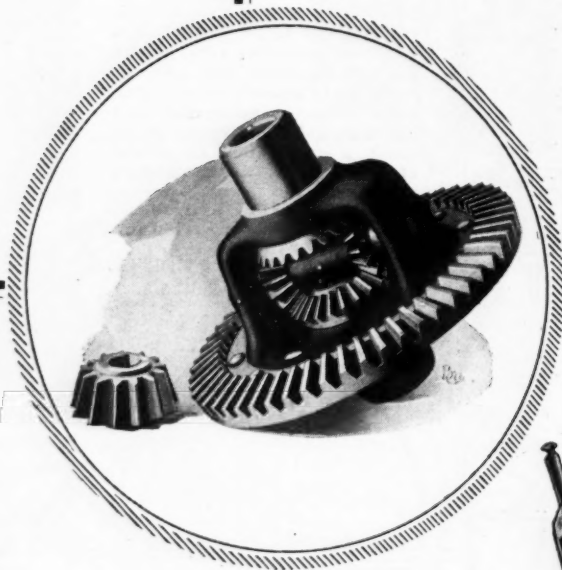
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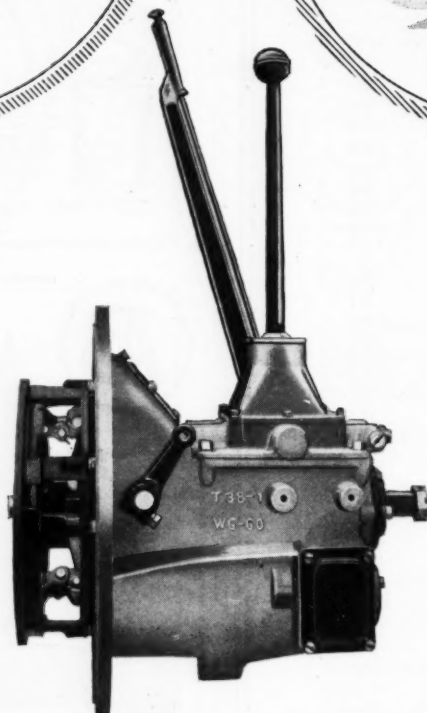
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"THE RECOGNIZED STANDARD"



Leaders



Leaders

You will find Warner Gear Co. products in the foremost cars in the industry—look for them when selecting your car. This high-grade product means your protection and years of satisfactory service from your car.

Warner Gear Company

Detroit Office:

Muncie, Indiana

967 Woodward Ave.

A Booklet of Surprising Value

about WIRE WHEELS IN GENERAL and

HOUK DETACHABLE WIRE WHEELS

IN PARTICULAR

Thousands of people have been waiting for an opportunity to obtain full and complete information about wire wheels. The realization that wooden wheels were a menace and wire wheels were indestructible, together with their many other advantages such as tire saving, and easy tire changing, has made information concerning them highly desirable.

For the first time a complete booklet on the subject has been published and will be sent to any reader of MOTOR AGE free for the asking.

Besides general wheel information of great value, it gives a listing of all the cars made, explaining sizes and types of wheels and rims, cost of equipment, etc.

Shall we send you your copy?

Houk Manufacturing Company
1701 Elmwood Ave., BUFFALO, N. Y.



HOUK MANUFACTURING CO.

Houk inner hubs are machined to the bearings which come with the wheels are to be fitted, consequently the surfaces of the inner hubs for different sizes of wheels are somewhat different. The general construction is the same.

COMFORT IN RIDING

SUSPENSION WHEEL. The remarkable shock absorbing properties of wire wheels are due to the fact that these are "suspension" wheels. This means that the weight of the car is hung from the spokes in the upper part of the wheel. When a wire wheel has no load on it, the spokes are all in equal tension; but when the wheel is in use on a car the load resting on the tire at the ground tends to lessen the tension in all the spokes in the lower part of the wheel and increase the tension in all the spokes in the upper part of the wheel, which, consequently, supports the weight of the car. This construction "cradles" the car and absorbs shocks before these get to the axle.



EASY TIRE CHANGING

POSITIVE SELF-TIGHTENING
Wire wheels are more easily made with the hub cap, slip off the wheel, and the tire can be changed without the use of any tools.



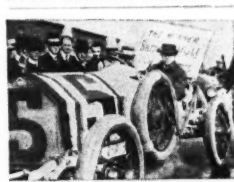
the car advances. It cannot be how far the car is backed up. The hub cap, but this is not a disadvantage over other wheels which require a special

STUDS
The studs are driven through the nickel steel drive studs, which represent a distinct advance over the older method used in wire wheel construction of

PRICE LIST BY CAR AND MODEL

Make of Car	Model	Wheel Size	Type of Wheel and Rim	Cost Extra
Abbott	1913-14-15 All Models	34 x 4	5-40 QD S.	
Alco	1913-14 9-40	34 x 4	6-71 QD Q.	
Alto	1915	34 x 4	6-40 QD Q.	
Apperson	1915 6-47	34 x 4	6-40 QD Q.	
Auburn	1915 36	34 x 4	6-40 QD Q.	
	1915 6-48	34 x 4	6-40 QD Q.	
Black	1910-11	34 x 4	6-40 QD Q.	
	1910-15-17	34 x 4	6-40 QD Q.	
	1910-19-21	34 x 4	6-40 QD Q.	
	1911-20-22	34 x 4	6-40 QD Q.	
	1912-23	34 x 4	6-40 QD Q.	
	1913-24	34 x 4	6-40 QD Q.	
	1914-25	34 x 4	6-40 QD Q.	
	1915-26	34 x 4	6-40 QD Q.	
	1916-27	34 x 4	6-40 QD Q.	
	1917-28	34 x 4	6-40 QD Q.	
	1918-29	34 x 4	6-40 QD Q.	
	1919-30	34 x 4	6-40 QD Q.	
Cadillac	1913-14-15	34 x 4	6-40 QD Q.	
	1915 7	34 x 4	6-40 QD Q.	
Camp	1913-14-15	34 x 4	6-40 QD Q.	
	1915 30-31	34 x 4	6-40 QD Q.	
	1916 32	34 x 4	6-40 QD Q.	
	1917 33	34 x 4	6-40 QD Q.	
Chalmers	1914-15	34 x 4	6-40 QD Q.	
	1916-17	34 x 4	6-40 QD Q.	
	1918-19	34 x 4	6-40 QD Q.	

HOUK MANUFACTURING CO.



Buick Oldfield and His Buick
696 MILES TO VICTORY ON HOUK WHEELS

Over the worst roads conceivable, high miles of desert sand, rocks, mud, deep ruts, dangerous chuck holes, Buick Oldfield, in a Buick car, equipped with Houk Wire Wheels, won the Los Angeles-Panama Road Race, with only one tire change. Oldfield, again on a Maxwell, equipped with Houk Wire Wheels, broke the world's record of 300 miles at Corona, Cal., without a stop. His average was 80 miles per hour.



Buick Oldfield's Record Breaking Buick



Charles Y. Knight Says:

"The fact that the finest European cars are equipped with the Knight Motor is significant.

"The fact that these cars cost from \$4,000 to \$8,000 each is of further interest.

"The fact that very shortly a large American automobile manufacturer will announce a Knight motored car which is the efficiency equal of the Daimler of England, the Panhard of France, the Mercedes of Germany, and the Minerva of Belgium is of still greater interest.

"But the concluding fact that *this* Knight motored car will sell in the neighborhood of \$1,000 is of the greatest interest."